

2

A

MISCELLANY,

FOR

Young Persons,

BY THOMAS WRIGHT.

K

---

In vain, without fair culture's kindly aid,  
Without enliv'ning suns and genial show'rs,  
And shelter from the blast—in vain we hope  
The tender plant can rear it's blooming head,  
Or yield the harvest promis'd in it's spring.

Akenside.

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PRINTED CHIEFLY FOR THE USE OF THE AUTHOR'S SEMINARY,

At South-Town,

NEAR GREAT YARMOUTH.

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## P R E F A C E.

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ALTHOUGH several writers, as well as readers, have spoken disrespectfully of prefaces, I nevertheless declare myself in their favour. A preface, exquisitely written, is a delicious morsel: and if an author is inveterately dull, it is a kind of preparatory information which may be useful. It argues a deficiency in taste, to turn over a preface unread; for it is the odour of the author's roses; every drop distilled at immense cost. It is the reason of the reasoning; the folly of the foolish; and, as the Italians say, *La salsa del libro*,—the sauce of the book.

A work

A work with a poor preface, like a person with an indifferent recommendation, must display uncommon merit to master our prejudices; and to please us, as it were, in spite of ourselves. A work, ornamented by a finished preface, inspires us with awe; we observe a veteran guard placed in the porch, and we are induced to conclude from this appearance, that some person of eminence resides in the place itself.

But of all literary performances, a work like the present might be permitted to appear without the accustomed preface; because a MISCELLANY is only a kind of preface; it is rather an introduction to subjects, than subjects themselves: and like a preface, is frequently more pleasing than the completer work.

It has been said, that an author obtains no reputation by forming a horn-book for  
babes;



babes; and that but little difficulty lies in *making* books, by collecting from the labours of others. And yet a painter is not less a painter, because he goes out for his colours; nor is an architect less an architect, because he purchases his building materials. Perhaps there are few books to which an author can prefix his name, without trespassing on his veracity. Sterne says, *It is all pouring out of one bottle into another.*

In the following pages I have arranged some of the materials of my observation; and have blown into a little flame a few sparks of science. Long-continued absurdity has no prescriptive claim to respect. Men would soon be at a stand in their attainments, if they did not derive from experience some helps for accelerating the progress of the human mind, and for correcting the injudicious methods of those who preceded them. Perfection, though unattainable, must still be the frequent

frequent object of our contemplation, because every kind of excellence is a portion of perfection; and no portion can be accurately appreciated, if we are incapable of forming some idea of the whole.

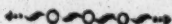


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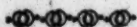


COMMENTS

1. The first of these is the fact that the  
2. second is the fact that the  
3. third is the fact that the  
4. fourth is the fact that the  
5. fifth is the fact that the  
6. sixth is the fact that the  
7. seventh is the fact that the  
8. eighth is the fact that the  
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## Address.



YE docile youths who learning love,  
And would in various arts improve,  
To South-Town come, and there attend  
The precepts of a watchful friend.

When morning's light unseals your eyes.  
And to your studies bids you rise ;  
First to the GREAT CREATOR pray  
To bless the bus'ness of the day :  
For know those labours are but vain,  
Which no celestial blessings gain.  
When wash'd, and decent in your dress,  
And each in school assumes his place ;  
Study the task that is assign'd,  
And get it with a willing mind :  
But while you at your books remain,  
*Silence* must hold her strictest reign ;  
For this I've found by daily use,  
Will to your progress much conduce.

You that in *Writing* would excel,  
Must imitate your copies well :  
Down strokes make *strong*, the upward, *fine*,  
And freedom with your boldness join.

B

If

If by luxuriant fancy bent,  
 You aim at curious ornament—  
 Your plastic pen, by frequent use,  
 May fishes, birds, and beasts produce;  
 But chiefly strive to gain a *hand*  
 For *Bus'ness*—with exact command.

When *Figures* exercise your quill,  
 They ask for all your care and skill.  
 In writing, fancy's whim may guide,  
 But reason here must be appli'd.  
 As you the steep ascent pursue,  
 Expanding scenes will bless your view:  
 The *Mathematics'* spacious field,  
 Will noble, useful prospects yield;  
 And as by *Globes*, o'er seas you rove,  
 Or trace the glowing orbs above—  
 Wond'ring, J. HOVAH's pow'r you'll find,  
 While *Reason* satisfies the mind.

Who in *Composing* would excel,  
 Must understand his grammar well:  
 Structures of learning, none can raise,  
 Except he this foundation lays.

When from the *School* you are dismiss'd,  
 And have my leave to play or rest—  
 (For he with ease his labours bears  
 Who mixes pleasure with his cares,)  
 Still let my dictates have their sway,  
 And regulate you in your play.

Such



Such sportful exercises choose,  
 As will the most to health conduce;  
 The *Swings*, the *Kick-ups*, *Hoops* and *Ball*,  
 By turns the junior pupils call;  
 But senior boys should e'er resort  
 To some more strong and manly sport.  
 Yet mind you give no way to rage,  
 Nor money in your play engage;  
 For fordid thirst of gain destroys  
 The peace of mind of men and boys.

Ever abhor a lying tongue,  
 And never do your fellow wrong;  
 From oaths and idle talk refrain,  
 And tales of ghosts—they're false as vain:  
 But if to study you're inclin'd,  
 And with refreshment for your mind,  
 Historians, and poetic lays  
 Impart instruction while they please;  
 The *School* with various books abound,  
 In which advice and mirth are found;  
 For moral lessons, finely said,  
 There the *Spectators* you may read—  
 While ev'ry hue of fancy shines  
 In the *Selections'* spotless lines:  
 There, what instructive *Fables* say,  
 You soon may learn of gentle Gay—  
 But wanton songs and wild romance  
 Are banish'd, banish'd far from hence.

Soon as your judgment waxes strong,  
 And can distinguish right and wrong;  
 Think it no task to read, O YOUTH!  
 The Testaments of sacred truth:  
 Pore them with fixt attention through,  
 And ask whate'er you do not know;  
 Search them by day with fond delight,  
 And meditate on them by night.

When, for your meals, the bell you hear,  
 Without the least delay appear;  
 At table in decorum sit,  
 Nor prate—it's vulgar when at meat:  
 In food observe the golden mean;  
 And keep your clothes and linen clean.  
 And when you've eat' what doth suffice,  
 Give thanks, then in good order rise.

One precept yet remains behind,  
 Which you must ever keep in mind;  
 Of foolish chat in bed beware,  
 Be silent and be modest there:  
 Thus, as your head the pillow bears  
 Apply to HIM who always hears  
 The breathings of a pious breast,  
 And safely you may sink to rest.



# Select Sentences,

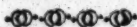
ARRANGED

ALPHABETICALLY.



He may be justly numbered amongst the benefactors of mankind, who contracts the great rules of life into short sentences, that may be easily impressed on the memory, and taught by frequent recollection to recur habitually to the mind.

Dr. Johnson.



A Quiet conscience sleeps in thunder.  
 Ask thy purse what thou shouldst buy.  
 A fault once denied is twice committed.  
 A faithful friend is the medicine of life.  
 A good man can never be miserable, nor a wicked  
 man happy.  
 A wife and good man is never less alone than when  
 alone.  
 As the shadow waiteth on the substance, so true  
 honour attendeth upon virtue.  
 A little wrong done to another, is a great wrong  
 done to ourselves.  
 A great man will not trample on a worm, nor sneak  
 to an Emperor.

B 3

A few



A few pains and a few pleasures, are all the materials of human life.

Abundance is a trouble; want a misery; honour a burthen; advancement dangerous; but competency a happiness.

Associate with persons rather above than beneath yourself; gold, pocketed with silver, loseth both it's colour and weight.

A man who keeps riches and enjoys them not, is like an ass that carries gold and eats thistles.

As the rose breatheth sweetness from it's own nature; so the heart of a benevolent man produceth good works.

A good layer up makes a good layer out; and a good sparer makes a good spender. No alchymy like saving.

Be lively but not light; solid but not sad.

Borrow not too much upon time to come.

By others' faults, wise men correct their own.

Be grateful to thy father, for he gave thee life; and to thy mother, for she sustained thee.

Confine your tongue, or it will confine you.

Craft begs for clothes; truth loves to go naked.

Close thine ear against those that open their mouths against others.

Children obey your parents: honour thy father and mother is the first commandment with promise.

Depend

**Depend** on God, for he is independent.

Diffidence averts envy from excellence, and censure from miscarriage.

Do good with what thou hast, or it will not do thee good.

Death hath nothing terrible in it, but what life hath made so.

Do nothing in thy passion. Why wilt thou put to sea in the violence of a storm?

Do good to thy friend that he may be more thy friend; and unto thy enemy, that he may become thy friend.

Diligence is the parent of intelligence and the dispenser of excellence: she commands all arts and sciences: and crowns her lovers with honour.

*Every May-be* hath a *may-not-be*.

Every fool can find faults which many wise men cannot remedy.

Examples do not authorise a fault: vice must never plead prescription.

Envy not the appearance of happiness in any man; for thou knowest not his secret griefs.

Enough of evil is allotted unto man; but he maketh it more while he lamenteth it.

**Foreright** is the right eye of prudence.

Few envy the merit of others, that have any of their own.

Fear may keep a man out of danger; but courage only can support him in it.

Friendship improves happiness and abates misery, by the doubling of our joy and dividing our grief.

Frugality may be termed the daughter of prudence; the sister of temperance; and the parent of liberty.

Good offices are the cement of society.

Getting is a chance, but keeping a virtue.

Good nature is a misfortune if it wants prudence.

Gratitude preserves old friendship, and procures new.

Grateful people resemble those fertile lands, which give more than they receive.

Good works will never save you; but you will never be saved without them.

Good actions once resolved, should be like fixed stars, not subject to retrograde motions.

Hurry trips up it's own heels.

He that walks only by the light of nature, walks in darkness.

He that finds a thing steals it, if he endeavours not to restore it.

He who is revengeful keeps his wounds open, which otherwise would close of themselves.

He who makes an idol of his interest, will make a martyr of his integrity.

He



He is a happy man who hath a friend at his need;  
 but he is more happy who needeth not a friend.  
 He who gave thee passions, gave thee reason to sub-  
 due them: exert that reason, and passions shall  
 fall at thy feet.

**Imprudence** is the constant companion of the mon-  
 ster ingratitude.

It is wise not to seek a secret; and honest not to  
 reveal it.

If you would know the value of a ducat, try to  
 borrow one.

If you can say no good of your neighbour, say no  
 ill of him.

If you are not good for any thing, do not expect  
 any thing from men.

It is with our time as with our estates; a good  
 manager makes much of it.

In your worst state hope, in your best fear; but in  
 both be circumspect: man is a watch which  
 must be looked to, and wound up every day.

**Just** praise is only a debt; flattery is a present.

**Keep** your shop, and your shop will keep you.

Knowledge is the treasure; but judgment the trea-  
 surer of a wise man.

Knowledge will soon become folly, if good sense  
 ceases to be it's guardian.

**Live** and let live.

**Liberality** is not giving largely, but giving wisely.

**Learn** how to receive, and know how to refuse a  
favour.

**Learning** is preferable to riches; and virtue to  
both.

**Leisure** without learning is death; and idleness is  
the grave of a living man.

**Let** not adversity tear off the wings of hope; nei-  
ther let prosperity obscure the light of pru-  
dence.

**Hate** other persons' shipwrecks thy sea-marks.

**Moderation** is commonly firm; and firmness is  
commonly successful.

**Make** no enemies; he is insignificant who can do  
thee no harm.

**Men** never have a better opinion of us, than when  
we assist them to have a good opinion of them-  
selves.

**Order** wade in unknown waters.

**Never** wish a thing done, but do it.

**Nothing** is more ridiculous than to be serious about  
trifles, and to be trifling about serious mat-  
ters.

**No** summer but has a winter: he never reaped  
comfort in his adversity, who sowed it not in  
his prosperity.

**Obedience**

Obedience is better than many oblations.

Our virtues would be proud, if our vices whipped them not.

Often remembering an injury, does us more hurt than receiving it.

Only good and wise men can be friends; others are but companions.

One often repents of saying too much; but seldom of saying too little.

Omit no opportunity of doing good; and you will find no opportunity for doing ill.

Our life is like a comedy: the breakfast is the prologue; dinner the interlude; and supper the epilogue.

Point not at another's spots with a soiled finger.

Prepare for sickness in health; and old age in youth.

Piety is the only proper and adequate relief of decaying man.

Pardon all, where there is either sign of repentance, or hope of amendment.

Prosperity is not a just scale: adversity is the only balance to weigh friends.

Put a bridle on thy tongue; lest the words of thine own mouth destroy thy peace.

Quantity is of less consequence than quality.

Repentance is the whip for fools.

Remember that lost time never returns.

Religion



Religion is the best armour ; but the worst cloak.

Reputation is to virtue, as light to a picture.

Riches beget pride; pride, impatience; impatience,  
revenge; revenge, war; war, poverty; po-  
verty, humility; humility, patience; patience,  
peace; and peace, riches.

~~Sell~~ not virtue to purchase wealth.

Sins, like debts, are always more than we think  
them to be.

Superstition renders a man a fool; and scepticism  
makes him mad.

Storms in the conscience will always lodge clouds  
in the countenance.

~~True~~ greatness is to be master of ourselves.

To live is a gift; to die is a debt.

The only way to be amiable is to be affable.

The best way of revenge is not to imitate the injury.

The greatest misfortune is not to be able to bear  
misfortune.

The comfort of virtuous parents, is to have chil-  
dren that resemble them.

The sum of Christian morality is, *give and for-  
give; bear and forbear.*

'Tis virtue only that repels fear; and fear only that  
makes life troublesome.

The luxurious live to eat and drink; but the tem-  
perate eat and drink to live.

The great business of man is to improve his mind,  
and govern his manners.

To

To dread no eye, and to suspect no tongue, is the great prerogative of innocence.

To own yourself in an error, is to shew that you are wiser than you were.

The whole universe is your library; conversation, living studies; and remarks upon them, your best authors.

To imitate the best, is the best imitation; and a resolution to excel, is an excellent resolution.

The tears of the compassionate are sweeter than dew-drops, falling from roses on the bosom of the earth.

The speech of a modest man giveth lustre to truth; and the diffidence of his words excuseth his error.

The clock of the tongue will go wrong, if it be not set by the dial of the heart.

The thunder bursteth over the head of the innocent in vain; and the lightning serveth to shew the glories of his countenance.

The main of life is composed of insect vexations, which sting us and fly away; and of impertinencies, which buzz awhile about us, and are heard no more.

To be humble to your superior is duty; to equals, courtesy; to inferiors, nobleness; to all, safety: fortune may begin a man's greatness; but it is virtue that must continue it.

Uain

~~Gain~~ glory blossoms, but never bears.

Virtue is the greatest ornament; and good sense  
the best equipage.

~~Understanding~~ a thing is half doing it.

Useful knowledge has no enemies, except the ignorant: it cherishes youth; delights age; is an ornament in prosperity; and a comfort in adversity.

~~Would~~ you excel in arts; excel in industry.

Wealth, without friends, is like life without health.

Wisdom is better without inheritance, than inheritance without wisdom.

Would you perpetuate your reputation, do things worth writing, or write things worth reading.

~~Xenophon~~ counted the wise man happy.

Young men, when once dyed with pleasure, will seldom take any other colour.

Young people tell what they do; old people, what they have done; and fools, what they intend to do.

You may be seen to give; but give not to be seen.

Zeal, without knowledge, is but religious wild-fire.

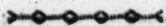




# Maxims,

IN

V E R S E.



GIVE God, thy Great Creator, homage due;  
 Consider first thy bus'ness, then pursue:  
 Converse with honest men; let such be dear:  
 In self-conceitedness let nought appear:  
 To others' judgment due regard be shown;  
 Be ever modest to defend thy own:  
 Whoever speaks, him with attention hear:  
 Nor study how to make thy wit appear:  
 Talk that to each which each best understands,  
 The tongue pronouncing what the heart commands:  
 Think on thy promise; but disdain t'evade,  
 By subtle arts, your promises when made:  
 Let speech obliging, gently, sweetly fall;  
 And in your looks, at least, be kind to all:  
 Let your whole air be disengag'd and free;  
 Yet not invite familiarity:  
 Give none, by hasty judgment, cause to grieve;  
 Love without interest; without fear forgive:  
 Avoid contention; friendship cultivate;  
 Respect, but never fawn upon the great:  
 Aim not to make thy friend his thoughts reveal;  
 With seeming openness thy own conceal:

Lend

Lend readily, if lending you propose;  
 He doubly gives, who gracefully bestows:  
 Weigh well the talent for the part you'd play;  
 Avoid extremes, and choose the middle way:  
 Speak peace where discord reigns; assuage the flood;  
 And for revenge persist in doing good:  
 Let proper objects never want a tear;  
 Excuse mistakes; in friendship be sincere:  
 From peevish thoughts thy cheerful mind defend;  
 Nor in rash words discharge upon thy friend:  
 Reprove with gentleness; with truth commend;  
 Laugh at a jest; but laugh not without end:  
 To each man's calling just respect be shown;  
 Nor criticise to make your learning known:  
 Do favours privately; if you upbraid,  
 Or publish first, the obligation's paid:  
 Prevent petitions where you see distress;  
 Nor let the manner make the gift the less:  
 If anger kindle, check th' impetuous flame;  
 Nor let thy tongue traduce an absent name:  
 Let not ingratitude thy honour stain;  
 Play for diversion; but despise the gain:  
 Scorn to deceive; think much, but little speak;  
 Preserve what's giv'n you, for the giver's sake:  
 Pardon your debtors—equal pleasure flows  
 To him who mercy finds, and him who mercy shows:  
 Be envy banish'd from the gen'rous heart;  
 Blab not the secrets which thy friends impart:  
 In speaking of thyself, nor praise, nor blame;  
 And dread to be a slave to common fame.

FOR

P. V

S. A

P. V

S. C

P. C

S. C

P. V

S. M

P. V

S. T

P. V

S. T

P. V

S. M

**Questions,**  
 FOR THE INSTRUCTION OF CHILDREN,  
 IN THE  
**CHURCH CATECHISM.**

On the Privileges of Baptism.

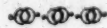
- P. WHAT were you made at your baptism?  
 S. A member of Christ.  
 P. Whose child were you made?  
 S. God's child.  
 P. Of what were you made an inheritor?  
 S. Of the kingdom of heaven.  
 P. Were these privileges conferred upon you without any conditions?  
 S. No.  
 P. What are the conditions?  
 S. That I perform my baptismal vow.  
 P. What is your baptismal vow?  
 S. To renounce the devil and all his works.  
 P. Who promised you should do this?  
 S. My godfathers and godmothers.

C

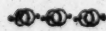
P. In



- P. In whose name did they promise it?  
 S. In my name.  
 P. What did they promise that you should believe?  
 S. All the articles of the christian faith.  
 P. What did they promise that you should keep?  
 S. God's holy will and commandments.  
 P. Are you willing to do all that your godfathers  
 and godmothers promised for you?  
 S. Yes.  
 P. But do you think you are able to do it of your  
 own ability?  
 S. No.  
 P. How then do you think you should be enabled  
 to do it?  
 S. By God's help.  
 P. What must you do to obtain God's help?  
 S. I must pray to God for it.



### On the Creed.



- P. Who is God?  
 S. The Supreme Being.  
 P. Who is the Father Almighty?  
 S. God.  
 P. Did God make heaven and earth?  
 S. Yes.

P. Who

- P. Who is Jesus Christ ?  
 S. The only son of God.  
 P. Whom do we call our Lord ?  
 S. Jesus Christ.  
 P. Who was conceived by the Holy Ghost ?  
 S. Jesus Christ.  
 P. Who was born of the Virgin Mary ?  
 S. Jesus Christ.  
 P. Who suffered under Pontius Pilate ?  
 S. Jesus Christ.  
 P. Who was Pontius Pilate ?  
 S. A governor of Judea, in the reign of Tiberius.  
 P. What death did Jesus Christ suffer ?  
 S. He was crucified.  
 P. On what day did he rise from the dead ?  
 S. The third day.  
 P. Whither did he ascend ?  
 S. Into heaven.  
 P. To what place ?  
 S. To the right hand of God.  
 P. Why do you say to the right hand of God ?  
     Hath God hands ?  
 S. No : God is a spirit, and hath no body, nor parts  
     of a body.  
 P. What then do you mean by the right hand of  
     God ?  
 S. The chief place of honour and dignity, under  
     God the Father.

P. Shall Jesus Christ ever come from the right hand of God?

S. Yes.

P. What shall he come to do?

S. To judge the quick and the dead.

P. Shall every one, on that day, give an account of his thoughts, words and actions?

S. Yes: and therefore this is the most serious truth that ever was revealed to mankind.

P. Can any escape this judgment?

S. None.

P. How many persons do you believe in?

S. Three.

P. Which are they?

S. God the Father, God the Son, and God the Holy Ghost.

P. To which of these is the *creation* of the world ascribed?

S. To God the Father.

P. To which is the *redemption* of the world ascribed?

S. To God the Son.

P. What does the Holy Ghost for us?

S. He *sanctifies* us.

P. Who is the Holy Ghost?

S. The Third Person in the Sacred Trinity.

P. Is not the Holy Ghost God?

S. Yes.

P. You



P. You say, that you believe in God the Father,  
 God the Son, and God the Holy Ghost—  
 Are these three Gods?

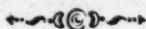
S. No.

P. What are they then?

S. Three persons in one Godhead.



### On the Commandments.



P. WHAT is the first commandment?

S.

P. What is the second?

S.

P. What is the fourth?

S.

P. What is the eighth?

S.

P. The seventh?

S.

P. The ninth?

S.

P. The sixth?

S.

P. Which of them forbids all acts of cruelty, malice and revenge?

S. The sixth.

C 3

P. Which

P. Which forbids stubbornness, disobedience, and undutifulness to parents?

S. The fifth.

P. Which forbids stealing?

S. The eighth.

P. Which forbids lying and flandering?

S. The ninth.

P. Which forbids swearing, cursing, and taking God's name in vain.

S. The third.

P. Which of them requires us to be faithful to the interest, character, and good name of our neighbour?

S. The ninth.

P. Which requires us to pray to God to hear his word read and preached; and to attend the ordinances of religion?

S. The fourth.

P. Which commandment requires the duty of temperance, soberness and chastity?

S. The seventh.

P. What does the fifth commandment require, with respect to your father and mother?

S. To love, honour and succour them.

P. What is your duty to the king, and all that are put in authority under him?

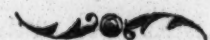
S. To honour and obey them.

P. In what manner are you to demean yourself to your teachers, spiritual pastors and masters?

/ S. To

- S. To submit myself to them.
- P. How are you to behave to your betters?
- S. Lowly and reverently.
- P. What are you *not* to do to any body?
- S. I must not hurt any one.
- P. What are you to be in all your dealings?
- S. True and just.
- P. What are you *not* to bear in your heart?
- S. Neither malice nor hatred.
- P. What are you to keep your hands from?
- S. Picking and stealing.
- P. From what are you to keep your tongue?
- S. From evil speaking, lying and flandering.
- P. How are you to keep your body?
- S. In temperance, soberness and chastity.
- P. What are you *not* to do with respect to other men's goods?
- S. I am not to covet nor desire them.
- P. What are you to learn and labour for?
- S. To get my own living.
- P. And what are you to do in *that* state of life, unto which it hath pleased God to call you?
- S. I am to do my duty.







## On Prayer.



- P. ARE we able of ourselves to believe and to do all that we promised in our baptism?
- S. No.
- P. What ought we to do then?
- S. We ought to pray to God for his grace to assist us in the performance of our duty.
- P. What is grace?
- S. The favourable influence of God on the human mind.
- P. Will the bare repetition of our prayers be sufficient to recommend us to the favour of God?
- S. No.
- P. What does God require of us when we pray?
- S. He requires of us to pray with our hearts as well as with our lips.
- P. Will our prayers be conducive to our happiness without our endeavours?
- S. No.
- P. What prayer are we commanded to use?
- S. The Lord's prayer.
- P. Is not prayer one of the principal means of grace?
- S. Yes.
- P. What is another means of grace?
- S. Receiving the blessed sacrament.



## On the Sacraments.



- P. WHAT do you mean by the word sacrament?
- S. I mean an outward and visible sign of an inward and spiritual grace.
- P. How many sacraments are there?
- S. Two.
- P. Which are they?
- S. Baptism, and the supper of the Lord.
- P. How many parts are there in a sacrament?
- S. Two.
- P. What are those parts?
- S. The *outward visible* sign, and the *inward spiritual* grace.
- P. What is the outward sign in the sacrament of baptism?
- S. Water.
- P. With what are persons baptized?
- S. Water.
- P. In whose name are they baptized?
- S. In the name of the Father, and of the Son, and of the Holy Ghost.
- P. What is the inward or spiritual thing signified?
- S. A death unto sin.

P. By

- P. By whom were those signs ordained?  
 S. By Christ himself.
- P. Is any thing required of persons to be baptized?  
 S. Yes; repentance and faith.
- P. What do you mean by repentance?  
 S. The forsaking of sin.
- P. What is faith?  
 S. Trust in God.
- P. If faith and repentance are required of baptized persons, why then are infants baptized, when, by reason of their tender age, they cannot perform faith and repentance?  
 S. Because the infants promise faith and repentance by their godfathers and godmothers; which promise, when the infants come to age, themselves are bound to perform.
- P.\* What was the design of instituting the sacrament of the Lord's supper.  
 S. For the continual remembrance of the sacrifice of the death of Christ, and of the benefits which we receive thereby.
- P. What was the outward sign of the sacrament of the Lord's supper?  
 S. Bread and wine.
- P. What is the inward thing signified?  
 S. The body and blood of Christ.
- P. By whom is the body and blood of Christ received after a spiritual manner?  
 S. By the faithful.

P. Is



P. Is the body and blood of Christ received after a spiritual manner by none but the faithful?

S. No.

P. What are the advantages of receiving this blessed sacrament worthily?

S. The strengthening and refreshing of our souls, by the body and blood of Christ.

P. Is any thing required of those who come to the sacrament of the Lord's supper?

S. Yes, they must examine themselves.

P. How must they examine themselves?

S. Whether they repent *truly* of their former sins.

P. What must they purpose?

S. To lead a new life.

P. In what manner must they purpose to lead a new life?

S. Stedfastly.

P. What must those who come to the sacrament of the Lord's supper examine themselves in next?

S. Whether, through Christ, they have a lively faith in God's mercy.

P. What is further to be examined?

S. Whether they have a thankful remembrance of the death of Christ.

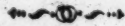
P. What is to be examined in the last place?

S. Whether they are in charity with all men.



THE

# Ten Commandments, IN VERSE.



1. HAVE thou no other gods but me,
2. And to no image bend thy knee:
3. Take not the name of God in vain;
4. Nor e'er the sabbath-day profane.
5. Thy father love and mother too;
6. And mind, thou shalt no murder do.
7. From vile adultery keep clean;
8. Nor steal, tho' thou art poor and mean:
9. Be no false test, thy soul 'twill spot;
10. And what's thy neighbour's, covet not.



## The Sum of all the Commandments.



LOVE God, of ev'ry thing above;  
And as thyself, thy neighbour love.



An Account  
 OF  
 THE BOOKS  
 OF  
 The Old and New Testament.

---

SOME of these books are styled Canonical, and others Apocryphal. The canonical books are so called, because they have been received among those excellent writings, in the Old Testament, which are universally acknowledged to have been penned by the prophets and holy men, inspired by God; as those in the New Testament were by the the disciples of Christ.

The first five of these books, namely, Genesis, Exodus, Leviticus, Numbers, and Deuteronomy, were written by Moses, and are called the Pentateuch.

The Book of Joshua is supposed to have been written, partly by himself, and partly by Eleazer, the high priest.

The books of Judges and Ruth, are generally allowed to have been written by Samuel.

The



The first and second books of Samuel, were written by Samuel, the seer; Nathan, the prophet; and Gad, the seer.

The first and second books of Kings, were written by Nathan, the prophet; Aliah, the Shilohite; Iddo, the seer; Jehu, the prophet; and Simeia.

The first and second books of Chronicles, were compiled by Simeia, and Iddo, the seer.

The books of Ezra, and the books of Nehemiah, were written by Ezra, the priest.

The book of Esther, was compiled by Ahafuerus, out of the records of the Medes and Persians.

The book of Job is supposed to have been written by Elihu, to recommend patience to us, under all afflictions, with an entire dependance upon God in all adversities. Job was a good man; a near relation to Abraham, who lived in Arabia, about the time that the Israelites were in bondage.

The Psalms were written by several persons; but the principal part of them, by David, Moses, and Asaph; and were collected into a book by Esdras.

The Proverbs, Ecclesiastes, and Canticles, (or Songs) were written by King Solomon.



## Of the Books of the Prophets.

THESE holy men were called prophets, because they foretold future events by divine revelation.

Isaiah, the son of Amos, prophesied in the days of the kings Uzziah, Jothan, Ahaz, Hezekiah, and Manasses: He foretold, in a distinct manner, the coming of Christ; and the numerous circumstances attending his divine mission.

Jeremiah, son to Hilkiash, the priest, prophesied in the days of Josiah, Jehoiakim, and Zedekiah. He also wrote the book of Lamentations, in the time of the Babylonish captivity.

Ezekiel was a priest, and composed his prophecy in Babylon, in the time of Jehoiakim's captivity.

Daniel was a captive in Babylon; and prophesied in the days of Nebuchadnezzar, Evil—Merodach, and Belshazzar.

Hosea prophesied in the reign of Uzziah, Jothan, Ahaz, and Hezekiah.

Joel prophesied in the days of Uzziah and Jeroboam.

Amos was a poor shepherd, and prophesied at the same time with Hosea and Joel.

Obediah

Obadiah foretold the destruction of the Idumeans, who were the descendants of Esau, Jacob's brother.

Jonah lived in the reigns of Amaziah and Jeroboam; and prophesied against Nineveh, the chief city of the Assyrians.

Micah prophesied at the same time with Isaiah; and foretold the destruction of Israel and Judah, by the Assyrians and Chaldeans.

Nahum prophesied in the reigns of Hezekiah; he foretold the destruction of the Assyrians, by the Chaldeans and Medes.

Habakkuk prophesied about the same time; and foretold the destruction of Israel and Judah, by the Chaldeans.

Zephaniah prophesied in the days of Josiah, a few years before the Babylonish captivity; and threatened Judah and Jerusalem with desolation.

Haggai prophesied, after the return of the Jews from their seventy years' captivity in Babylon, and exhorted them to rebuild the temple.

Zechariah was sent to confirm the doctrine of Haggai, and to forward the building of the temple,

Malachi prophesied after the temple was rebuilt; and was the last of the prophets.

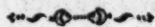
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## Of the Apocryphal Books.



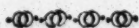
THESE are so called, because they are not certainly known to be true scripture. They were not written in Hebrew; yet the greatest part of them are excellent; and contain observations, worthy of our serious attention.



OF  
THE BOOKS  
OF  
*THE NEW TESTAMENT:*

AND FIRST OF

### *The Four Gospels.*



THE word Gospel is so called from the Saxon words *Godes Spel*, in English, Good Tidings; which, for better sound, is written and pronounced Gospel. These books contain the history of the birth, life, actions, precepts, promises, death, resurrection, and ascension of Christ.

D

The

The compilers of them, namely, St. Matthew, St. Mark, St. Luke, and St. John, are called evangelists.

St. Matthew wrote his gospel *eight* years after Christ's ascension.

St. Mark wrote his gospel, under the direction of St. Peter, *ten* years after the ascension.

St. Luke wrote his gospel *fifteen* years after the ascension; and,

St. John penned his gospel *thirty-two* years after the ascension.

The acts of the apostles were written by St. Luke.

The epistles to the Romans, Corinthians, Galatians, Ephesians, Philippians, Timothy, Titus, Philemon, and the Hebrews, are by St. Paul.

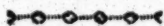
The other epistles were written by St. James, the son of Alpheus, the brother of Jude; (called also the brother of our Lord) St. Peter, one of the chief of the apostles; St. Jude, an apostle; and St. John, the son of Zebedee; who also wrote the Revelations.



THE  
**ORDER OF THE BOOKS**  
*In the Bible.*



GENE—Ex. Levit—Num. Deuter—Jof. ✓  
 Judge—Ruth, *and* Samu—Kings, Chron.  
 Ezra—Ne. Esther—Job, *and the* Psalms,  
 Prov—Ecclesiastes, Sol—Son.  
 Isa—Jer. Lament—Eze. Dan—Ho.  
 Jo—Amos. Ob—Jonah *and* Mi.  
 Nahum—Hab. Zephaniah—Haggai,  
 Zechariah, *and last* Malachi,



THE  
**ORDER OF THE BOOKS**  
*In the New Testament.*



Matthew—Mark, Luke—*and*—John, Acts—  
*and*—Rom.  
 Corinth—Gal. E—Phi—Col. Theſſalon,  
 Timo—Ti. Phile—Hebrews, Jam—Pe.  
 John, Jude, *and the* Rev'lacion.



THE

# Old and New Testament

## DISSECTED.

~~~~~

|                            |   |   |   |   |   |         |
|----------------------------|---|---|---|---|---|---------|
| Books in the Old Testament | - | - | - | - | - | 39      |
| Chapters                   | - | - | - | - | - | 929     |
| Verses                     | - | - | - | - | - | 23214   |
| Words                      | - | - | - | - | - | 592439  |
| Letters                    | - | - | - | - | - | 2728100 |

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Books in the New Testament	-	-	-	-	-	27
Chapters	-	-	-	-	-	260
Verses	-	-	-	-	-	7959
Words	-	-	-	-	-	181253
Letters	-	-	-	-	-	838380

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|                                       |   |   |   |   |   |         |
|---------------------------------------|---|---|---|---|---|---------|
| Books in both the Bible and Testament | - | - | - | - | - | 66      |
| Chapters                              | - | - | - | - | - | 1189    |
| Verses                                | - | - | - | - | - | 31173   |
| Words                                 | - | - | - | - | - | 773632  |
| Letters                               | - | - | - | - | - | 3566480 |

### Apocrypha.

|          |   |   |   |   |   |        |
|----------|---|---|---|---|---|--------|
| CHAPTERS | - | - | - | - | - | 183    |
| Verses   | - | - | - | - | - | 6081   |
| Words    | - | - | - | - | - | 152185 |

THE middle chapter, and the least in the bible, is  
the 117th Psalm.

The middle verse is the 8th of the 118th Psalm.

The word AND occurs in the Old Testament,  
35543 times.

The same word occurs in the New Test. 10684 times.

The word JEHOVAH occurs 6855 times.

### Old Testament.

THE middle book is Proverbs.

The middle chapter is the 29th of Job.

The middle verses are the 17th and 18th of the  
20th chap. of the 2d. Chron.

The least verse is the 1st. verse of the 1st. chap. of  
the 1st. Chron.

### New Testament.

THE middle book is the 2d of Theffalonians.

The middle chapters are the 13th and 14th Romans.

The middle verse is the 17th of the 17th chap. Acts.

The least verse is the 35th of the 11th chap. John.

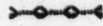
The 21st verse of the 7th chap. Ezra has all the let-  
ters of the alphabet.

The 19th chap. of 2d of Kings, and the 37th of  
Isaiah, are alike.

# An Explanation

## OF THE CHURCH

### *FASTS AND FESTIVALS.*



#### Epiphany.



A CHURCH festival, celebrated on the twelfth day after Christmas, in commemoration of our Saviour's being manifested to the world, by the appearance of a miraculous blazing star, which conducted the *Magi* to the place where he was.



#### Plough-Monday.



THE next Monday after Twelfth-day, when our northern peasants draw a plough from door to door, begging money to purchase drink with.

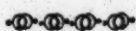


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## Septuagesima Sunday.

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THE third Sunday before Lent: so called from it's being about seventy days before Easter.



## Candlemas Day.



So called, because on that day (Feb. 2) candles are consecrated by the papists: it is the festival of the purification of the Virgin Mary.



## Sexagesima Sunday.



THE second Sunday before Lent; so called from it's being about sixty days before Easter.



Quinquagesima Sunday;

OR,

S H R O V E S U N D A Y.



Is so called from it's being about fifty days before Easter.



Shrovetide.



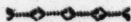
THE time in which our ancestors went to *shrive*, or *confess*.



Shrove-Tuesday.



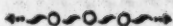
THE day before Ash-Wednesday.



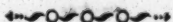
Ash-Wednesday.



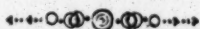
THE first day of Lent; so called from the ancient custom of fasting in *sackcloth* and *ashes*.



## Lent.



THE forty days of abstinence from Ash-Wednesday to Easter.



## Ember Week.



A WEEK on which an ember day falls. The ember days, at the four seasons are the Wednesday, Friday, and Saturday after the first Sunday in Lent; the feast of Pentecost; September fourteenth; and December thirteenth.



## Annunciation.



THE delivery of a message, particularly applied to the festival of Lady-Day, March the twenty-fifth, kept in remembrance of the angel's message to the Virgin Mary, concerning our Saviour's birth.



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## Palm Sunday.

~\*~

THE Sunday before Easter; so called from Christ's being met by the people, with palms in their hands.

~\*~

## Good Friday.

~\*~

THE day on which our Saviour's crucifixion is commemorated.

~~~~~

## Easter Day.

~\*~

THE day on which the Christian church commemorates our Saviour's resurrection.



—000—

## Rogation Week.

—0—

THE week immediately preceding Whitsunday, thus called from three fasts observed therein, Monday, Tuesday and Wednesday; called Rogation days, because of the extraordinary prayers and processions then made for the fruits of the earth, or as a preparation for the devotion of Holy Thursday.

—0—

## Ascension Day.

—0—

THE day on which the ascension of our Saviour is commemorated, commonly called Holy Thursday; the Thursday but one before Whitsuntide.

—0—0—0—0—

## Whitsuntide.

—0—0—

(So called from White and Sunday, because the converts, newly baptized, appeared from Easter to Whitsuntide

Whitsuntide in white.) A festival kept seven weeks after Easter, in remembrance of the descent of the Holy Ghost upon the Apostles. Whitsuntide is likewise called the feast of Pentecost, a feast among the Jews, when they offered the first fruits of wheat harvest, which then was completed: it was instituted to oblige the Israelites to repair to the temple; there to acknowledge the Lord's dominion, and also to render thanks to God for the laws he had given them from mount Sinai, on the fiftieth day after their coming out of Egypt.

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### Trinity Sunday.

THE first Sunday after Whitsunday.

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### Michaelmas.

THE feast of the archangel Michael, celebrated on the twenty-ninth day of September.

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## Advent.



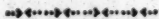
THE name of one of the holy seasons, signifying *the coming*; that is, the coming of our Saviour; which is made the subject of our devotion during the four weeks before Christmas.



## Christmas Day.



THE twenty-fifth day of December, on which the nativity of our blessed Saviour is celebrated, by the particular service of the church.



## Childermas, or Innocents' Day.



CHILDERMAS day, the twenty-eighth of December, observed in commemoration of Herod's slaying the innocent children.

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**Liturgy.**

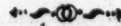
A formulary of public devotions.

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**Litany.**

A form of supplicatory prayer.

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**Rubric.**

DIRECTIONS printed in books of law, and in prayer books; so termed, because such directions were originally distinguished by being *red*.



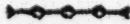
T E X T S,  
CONTAINING A SUMMARY  
OF THE  
**Christian Religion.**

—◆—  
Psalm 19.



VERSE 1. The heavens declare the glory of God,  
and the firmament sheweth his handy work.

Verse 2. Day unto day uttereth speech, and night  
unto night showeth knowledge.



Nehemiah, Chapter 9.

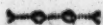


VERSE 6. Thou even thou art Lord alone; thou  
hast made heaven, and the heaven of heavens, with  
all their host; the earth and all things that are there-  
in; and thou preservest them all: and the host of  
heaven worshippeth thee.





*Ecclesiastes, Chapter 12.*



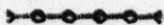
VERSE 1. Remember now thy Creator in the days of thy youth, while the evil days come not, nor the years draw nigh, when thou shalt say, I have no pleasure in them.



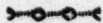
*1 Chronicles, Chapter 28.*



VERSE 9. And thou, Solomon, my son, know ~~thou~~ the God of thy father, and serve him with a perfect heart, and with a willing mind; for the Lord searcheth all hearts, and understandeth all the imaginations of the thoughts: if thou seek him he will be found of thee; but if thou forsake him he will cast thee off for ever.



*Michah, Chapter 6.*



VERSE 8. He hath showed thee, O man, what is good; and what doth the Lord require of thee, but to do justly, to love mercy, and to walk humbly with thy God?

—●—●—●—●—  
**Psalm 119.**  
 —●—●—

VERSE 9. Wherewithal shall a young man  
 cleanse his way? by taking heed thereto, according  
 to thy word.

—●—●—●—●—  
**Titus, Chapter 2.**  
 —●—●—

VERSE 11. For the grace of God that bringeth  
 salvation hath appeared to all men.

Verse 12. Teaching us that, denying ungodliness  
 and worldly lusts, we should live soberly, righte-  
 ously, and godly in this present world;

Verse 13. Looking for that blessed hope, and  
 the glorious appearing of the great God and our  
 Saviour Jesus Christ;

Verse 14. Who gave himself for us, that he  
 might redeem us from all iniquity, and purify unto  
 himself a peculiar people, zealous of good works.

—●—●—●—●—  
**Hebrews, Chapter 4.**  
 —●—●—

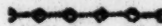
VERSE 16. Let us therefore come boldly unto  
 the throne of Grace, that we may obtain mercy,  
 and find grace to help in time of need.



## Psalm 9.



VERSE 17. The wicked shall be turned into hell,  
and all the nations that forget God.



## John, Chapter 5.



VERSE 28. Marvel not at this: for the hour is  
coming, in the which all that are in the graves shall  
hear his voice.

Verse 29. And shall come forth: they that have  
done good, unto the resurrection of life; and they  
that have done evil, unto the resurrection of damna-  
tion.



## 2 Corinthians, Chapter 5.



VERSE 10. For we must all appear before the  
judgment-seat of Christ, that every one may receive  
the things done in his body, according to that he  
hath done, whether it be good or bad.

VER  
on his  
inherit  
founda  
Ver  
his left  
everlast  
angels.  
Ver  
punish

GRAM  
The st  
Instru  
Corre



Matthew, Chapter 25.

VERSE 34. Then shall the king say unto them on his right hand, 'Come, ye blessed of my father, inherit the kingdom, prepared for you from the foundation of the world.'

Verse 41. Then shall he say also unto them on his left hand, 'Depart from me, ye cursed, into everlasting fire, prepared for the devil and his angels.'

Verse 46. And these shall go away into everlasting punishment: but the righteous into life eternal.

A poetical Epitome

OF

G R A M M A R.

GRAMMAR, my pretty boy, by rules does teach  
The strict proprieties of ev'ry speech:  
Instructs to speak and read, with proper grace;  
Correctly write; and elegance to trace.

E 2

There

There are ten kinds of words, in the English language : namely,

|            |               |
|------------|---------------|
| Article,   | Participle,   |
| Noun,      | Adverb,       |
| Pronoun,   | Conjunction,  |
| Adjective, | Preposition,  |
| Verb,      | Interjection. |

### Article.

THE articles are three, as most agree ;  
And here they follow, *a*, *an*, and *the*.

### Nouns.

NOUNS (called substantives) express we find,  
All objects of the senses, and the mind.  
In nouns we three peculiar species trace ;  
Fitting all substances in ev'ry case :  
And among them ideal beings place.

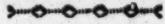
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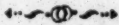
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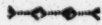
## Proper Nouns.



ALL proper nouns one of a kind exprefs ;  
As it was Adam made us all transgress.



## Common Nouns.



OF ev'ry kind, these nouns exprefs the whole ;  
As, man, bird, beast, fish, insect, reptile, fowl.



## Number.



Two numbers we distinct in nouns explore ;  
The singular means one ; the plural more :  
As man is singular, because but one ;  
But men and horses into plurals run.



## Gender.



Two genders still in ev'ry tongue prevail,  
Expressive of the female and the male :  
The masculine, as man, betokens he ;  
The feminine, as woman, meaneth she :  
Nouns without life, we neuter genders call ;  
As organ, penknife, map, book, swing or ball.



## Pronouns.

WE, proper names for pronouns, oft' resign ;  
As, you and I, stand for your name and mine.

## Personal Pronouns.

IN nouns three persons each grammarian seeks :  
The first, as I, and me, is he that speaks :  
The second is the person spoken to ;  
And is express'd by thou, and thee, and you :  
The third does persons spoken of suppose ;  
As he, she, it, him, her, they, them, these and those.

## Adjectives.

ALL nouns in proper adjectives we dress,  
Which each peculiar property express ;  
As a *good* man, *black* horse, a *jolly* boy ;  
An *entertaining* book, or *pretty* toy.  
By three degrees we adjectives compare  
The first is positive, as you are *fair* ;  
The next, or the comparative, does show,  
That Fanny Baas is *fairer* still than you :

But

But the superlative, or third degree,  
 Says, I'm the *fairest* creature that can be.  
 Again, we may compare with more and most;  
 As you are *fair*, and famous as a toast:  
 But with comparative degree compare,  
 You'll find another fairer, or *more fair*:  
 By the superlative it is decreed,  
 That I'm the fairest, or *most fair* indeed.

~~~~~  
**Verbs.**  
 ~~~~~

VERBS (called affirmations) serve to shew,  
 You suffer, or exist, or something do;  
 In short, in affirmations you may find  
 All actions of the body, or the mind.  
 Three times, the sense of affirmations bound;  
 And are in present, past, and future found.

~~~~~  
 The past time e'er displays a something done;  
 As, yesterday I play'd at taw, and won.

~~~~~  
 The present time, denotes the present, now;  
 As, I am writing; or, I write; I bow.

~~~~~  
 The future time, something to come explains;  
 As, I'll teach you—that is, if you'll take pains.

## Participles.

FROM verbs come participles ; and those in *ing*  
 Are active call'd ; as, verb to love, lov-*ing* :  
 Others are passive call'd ; and end in *ed* ;  
 As, verb to love ; participles, lov-*ed*.

## Adverb.

THE adverb, which some quality bestows,  
 The manner of the affirmation shows ;  
 As if I play'd with Charley, or with Bill,  
 Perhaps you'll say, I play'd extremely ill :  
 Or if I said my lesson, you may tell,  
 Like a good boy, I said it *very* well.

## Prepositions.

FORCE to expression prepositions grant ;  
 And give to nouns that energy they want.  
 Them, before nouns in general, we find ;  
 Tho' now and then, perhaps, they're plac'd behind ;  
 As, I was over hills and vallies sent :  
*Over* denotes the manner how I went.



## Conjunctions.

CONJUNCTIONS, words or sentences do join;  
 Explain the meaning, or the sense refine:  
 As, John *and* Robert went, like fools, to fight;  
*But*, tir'd of cuffing, left off ere 'twas night.

## Interjections.

THE interjection, of surprise combin'd,  
 Denotes some sudden passion of the mind:  
 Some strong emotion of the feeling soul;  
 When all the thoughts are brought beneath controul;  
 As, ah! alack! alas! ah! well-a-day!  
 O! let me find a purse—O! that I may.

OF

THE RIGHT PUTTING TOGETHER OF WORDS

In a Sentence,

*CALLED, SYNTAX.*

SYNTAX, by certain rules, distinctly shows,  
 How we, with ease, may sentences compose:  
 Respecting sentences, two things are found;  
 They're either formed as simple, or compound.  
A simple

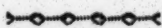
A simple sentence is, where but one name  
 Joins to an affirmation; as, Seek fame:  
 Two sentences a compound sentence make:  
 Thus, If you're good, you'll surely have a cake.

### Rules of Agreement.

1. IN number and in person must agree  
 The noun and verb; as, little George loves me.
2. A noun of multitude; the crowd's in haste,  
 Is better in the sing'lar number plac'd.
3. The adjective and substantive must still  
 Agree together; as, a gilded pill.
4. Two nouns (when a conjunction comes be-  
 tween) }  
 Have a verb plural; as under may be seen:  
 William and Frederic *love* our noble Queen. }



Letters to a Pupil,  
*ON IMPROPRIETIES;*  
 FREQUENT IN  
 WRITING AND CONVERSATION.



Dear Charles,

THE present is an age of liberal inquiry; and the importance of intellectual improvement is seldom controverted. Some sordid individual, perhaps, may *condescend* to inform us, that learning is useless, because *we can do without it*. "I know enough to write out an account for goods; and how to indite a letter; and every thing of that sort, as one may say: and as to any more than that, I don't care one farthing about it; not I. As to your learning, and your grammar, and all that, what good will it do to me? I have often heard Will Leatherhead say, as how riches is the main chance: and it is true enough for the matter of that: for what is a man without money? When I goes upon 'Change to do my business; I see plainly enough, that it is money that carries the day; and therefore, do you see, give me the cash, and let who will take your learning." Such is the usual tone of argument



ment with those who have no ideas, but what arise from the purchase and sale, the weight and admeasurement, of the various articles of trade. Their reasoning is not entitled to an elaborate confutation; and I will only observe, if our pursuits are to be limited to that which is *absolutely necessary*, we ought to resign, not only the elegancies of life, but even many of it's conveniencies. You have often heard me speak of the advantages of education; and you know, without it the most noble endowments may be buried in obscurity; and like unpolished gems, have value without lustre, and excellence without use.

“ Full many a gem of purest ray serene,  
The dark, unfathom'd caves of ocean bear;  
Full many a flower is born to blush unseen;  
And waste it's sweetness on the desert air.”

Human communication, my dear Charles, is the grand source of ideas; and to the multitude it is the only source. To combine and diversify the accumulated wisdom of ages is easy: to instruct the world by felicity of invention, is the lot of few. But if science be so valuable, and genius so rare, we never can be sufficiently grateful to Almighty God for *speech*, that divine scheme for the conveyance of sentiment, and the establishment of general intercourse—the parent, or the friend, of all that adorns and delights the soul of man. And hence

hence the utility of these letters: for without *precision* of language, there can be no *precision* of idea. Law would appear unintelligible jargon; and the sublimest conceptions of the philosopher, a mass of absurdities. This admitted, I need not question your conviction of the use of verbal criticism. But it may not be improper, first to give a few extracts from some authors of name and integrity. However, I have already written a long letter: you therefore must have patience, till you hear from me again.

Adieu.



## Dear Charles,

Cicero says, It is of the highest importance to speak with propriety; and Quintilian observes, All excellence in writing and speaking is founded on grammatical knowledge. They, who treat this knowledge as either trifling, or unpleasant, merit contempt; for the fabric that is raised on any other foundation, soon falls. It is necessary in youth, pleasing in age, and a delightful companion in retirement; and, contrary to *all* other studies, it has more utility than ostentation. They who engage in this important pursuit, will find it not only adapted to expand and invigorate the powers of youth, but to exercise the profoundest erudition and the most exquisite taste.

Mr. Locke says, Language being the means whereby men convey their discoveries, reasonings, and knowledge from one to another, he that uses words without any clear and steady meaning, leads himself and others into error. Most of the disputes in the world would end of themselves, and immediately vanish, if the words that are used in them were defined and reduced to a certain signification.

Lord Chesterfield. If it be necessary to attend so particularly to our *manner* of speaking, it is much  
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more so, with respect to the *matter*. Fine turns of expression, a genteel and correct style are ornaments, as requisite to common sense, as a polite behaviour, and an elegant address are to common good manners. Even trifles elegantly expressed will be better received than the best of arguments, homespun and unadorned. Be careful then of your style upon all occasions; whether you write or speak, study for the best words and the best expressions, and, if you are in doubt concerning the propriety or elegance of any word, have recourse immediately to some good author on the subject: if you be not sparing of your trouble, to write and speak well, will soon become habitual.

**Dr. Priestley.** The propriety of introducing the English grammar into schools cannot be disputed: a competent knowledge of our own language being both useful and ornamental in all; and a critical knowledge of it *absolutely necessary* to persons of a liberal education.

**Dr. Blair.** Whatever the advantages or defects of the English language be, as it is our own language, it deserves a high degree of our study and attention, both with regard to the choice of words which we employ, and with regard to the arrangement of these words in a sentence. And again—  
The

The many errors, even in point of grammar; the many offences against purity of language, which are committed by writers, who are far from being contemptible, demonstrate, that a careful study of the language is previously requisite in all who aim at writing it properly. He who is learning to arrange his sentences with accuracy and order, is learning at the same time, to think with accuracy and order; and this alone will justify all the care and attention we can bestow.

We cannot reflect on the wonderful power of language, without the highest admiration. What a fine vehicle is it now become for all the conceptions of the human mind; even for the most subtle and delicate workings of the imagination! From being a rude and imperfect interpreter of men's wants and necessities, it has now passed into an instrument of the most delicate and refined luxury. We admire several of the inventions of art; we plume ourselves on some discoveries, which have been made in latter ages to advance knowledge, and to render life comfortable; we speak of them as the boast of human reason: but certainly no invention is entitled to any such degree of admiration as language.

I confess, my dear boy, that these extracts are rather long; yet, I hope, you will often read them, and believe I am, very sincerely,

Yours.

**My Dear Pupil,**

I RECEIVED your clever letter yesterday ; and am pleased that you like the extracts. Indeed, the importance of a correct mode of expression in business, is sufficiently obvious. Shopmen, clerks, apprentices, and all who are engaged in the transactions of commercial life, may be assured, that the acquisition will procure them respect, and be highly conducive to their advancement in life.

In a country, therefore, where the industrious may become affluent, and the affluent ascend to the chief employments of the state ; it is certainly wise to attain the best education that circumstances will admit.

I shall give you my remarks in distinct sections ; that you may recur as often as you please to any difficult or favourite section, without embarrassment of ideas, or needless repetition of passages, already understood.

The mind of man, as Dr. Johnson judiciously observes, by such short, but vigorous flights, soon reaches the summits of human intelligence.

**I remain your's.**

F



Dear Boy,

I SHALL now begin my remarks; and first, Of the agreement between verbs and nouns. The force of habitual expression is the only apology which can be admitted for the violation of the laws of agreement. But this apology is to be restricted to familiar conversation. In letters, in public orations, and in compositions for the press, the transgression is highly disgraceful: and the presumption, that the public will pardon our negligence, on the plea of "attention to *things* rather than to *words*," is at once indecent and absurd.

~~~~~

### The First Section.

## SINGULAR FOR THE PLURAL.

1. *IN the British army, in time of peace, there is seventy-two regiments of foot.* DR. TRUSTLER.

2. *The powers of lightning, when accompanied with thunder, is great and wonderful.*

DR. TRUSTLER,

3. *The battle of Fontenoy, on April 30th, 1745, was one of the bloodiest in the age. The prodigies of*

*of valour exhibited by the English infantry, WAS the astonishment of mankind.* ANN. REGISTER.

4. *Her eyes WAS put out, when a child; and she was carried about, by a beggar woman, to excite charity.*

5. *The streets IS so dirty, that my shoes ISN'T fit to be seen.*

6. *This day IS published, Memoirs of the King of Prussia, &c.* ADVERTISEMENT.

7. *The monstrous Craws, or wild human beings, IS to be seen in the Hay-market.*

In the above instances it ought to be ARE, not IS: for monstrous Craws, Memoirs, shoes, streets, eyes, prodigies, and regiments are plural.

8. *When I told you, that sixteen ounces of gold would gild a quantity of silver wire, sufficient to circumscribe the globe, you WAS surprised.*

9. *You WAS in earnest, and you sought attention.*

DR. BLAIR.

This use of the word *you* is indefensible. It requires a verb plural. The learned Professor might write, with equal propriety, *You is in earnest. You seeks attention.*

10. *When an East-wind and West-wind RAGES, and MEETS each other with fury, they excite whirl-winds,*

winds, tempests, and hurricanes, which sweep away all before them.

DR. TRUSTLER.

11. *The zeal and amity of his physical friends, SEEMS to have rendered them very careful of doing enough for him.*

DR. KIRKPATRICK.

It is a received opinion among some grammarians, that any two nouns, which express synonymous ideas, may be used in construction, with a verb singular. But if the ideas are synonymous, one of them is unnecessary; if they are distinct, reason and analogy demand a plural. In either case, it is a blemish in composition. It is indisputably more correct and elegant to associate a verb plural with two nouns; and it has this advantage—be the words synonymous or not, you cannot err.

It is a law of composition, not to incumber your sentences with superfluous words. If the Doctor mean the same by *amity*, which he does by *zeal*, he has broken this law. If he desire to convey distinct ideas by the terms, the expression is not English. I should be exposed to infinite contempt, were I to write, *The King and his Majesty is to reside this summer at Windsor*. If I urge in my defence, *King and Majesty* are synonymous, the reply would be, then one must be superfluous. Were I to admit that *King* refers to a foreign sovereign, on a visit at the Court of London, any school-boy would



would inform me, that I had written false grammar; yet it would certainly be as correct as, *Two winds meets*; in the 10th instance.

It is a very common error, especially in speaking, to use there *is*, instead of there *are*; and here *is*, for here *are*.

12. THERE'S *your shoes*, HERE'S *your boots*.

13. *When their vices forsake them*, THERE'S *many flatter themselves*, *that they have forsaken their vices*.

Be careful to avoid such improprieties; and rest assuredly, I am,

**Yours.**

**Dear Charles,**

To record important revolutions, is the province of the historian; to detail civil and domestic occurrences, is the lot of all. It is, therefore, incumbent on all, to aim at a clear, agreeable manner of relating the common incidents of life. The feelings of the company, we may be assured, are exceedingly hurt, when two-thirds of the words employed on the occasion consist of *says I*; and, *says*

*he*; and, *so says I*; and, *so says she*. It is the best evidence of a happy talent in communicating information, when you make, by your tones and gestures, the repetition of such phrases unnecessary. And I must remind you, that the expression *says I*, not only has an unpleasant, hissing sound, in common with, *says he*, and *says she*; it is also a solecism: e. g.

15. *If there were no tale-bearers, SAYS I, contention would cease.*

That is, were there no tale-bearers, *I says* contention would cease. You may easily avoid both the harshness and the impropriety, by substituting *said I*, and *said he*.

The historian may be indulged in the use of, *says he*, if he *suppose* it will exhibit an event to greater advantage: e. g.

16. *Mr. Cole, our consul at Algiers, complained to the Dey, of the injuries which British vessels received from his cruizers. His REPLY was fair and ingenuous; the Algerines, SAYS HE, are a company of rogues, and I am their captain.*

It deserves notice, that there is no *elegance* in using *SAYS*, on this occasion; and it is still more remarkable, that there is no necessity for using it at all. Were it omitted, there would be far more  
grace

grace and energy in the expression. It is now feeble tautology—he *replied*, the Algerines, *says he*, are a company of rogues. But if it be unnecessary in a *written* narrative, it is insufferable in an anecdote, delivered, *viva voce*. He is a lifeless speaker, for instance, with no inflexion of voice, no variation of tone, who is under the necessity of using the phrase, *says he*, to inform his audience, that the Dey is the personage who speaks. It may also be remarked, that *answer* would be more proper here, than *reply*. *I speak; you answer. I reply; you rejoin.*

I beg you will often read these observations; as some care has been taken to render them familiar. Adieu, my dear boy, be diligent, be virtuous, and you will be happy.

.....

**Dear Pupil,**

HAVING in my former letters noticed many passages, where the singular has been used for the plural; I shall now pass my observations on a few others, in which you will find the

### **Plural for the Singular.**

1. No officer DARE contradict, dispute, or disobey the orders of his superior officer.

DR. TRUSTLER.

F 4

2 The



2. *The camel eats little, and lives commonly fifty years. To make it go on, the driver NEED only whistle or sing.* JOURNEY INTO EGYPT.

As officer is not a plural noun, it ought to be DARES. And for the same reason, NEEDS: e. g.

3. *I have seen an ostrich swallow bullets burning-hot from the mould, which no other animal DARES to do.* DR. SHAW.

4. *I dare do all that does become a man;  
Who DARES do more is none.*

SHAKESPEAR.

5. *If weevils infest the corn, the farmer NEEDS only put a lobster or two on the heap, and in less than four hours, the weevils will quit the barn or perish.* LETTERS ON AGRICULTURE.

6. *Allow not nature more than nature NEEDS.*

SHAKESPEAR.

The expression *were it* is very proper. It is conditional, and may be varied by *if*: e. g.

7. *WERE IT not for the fixed stars, it would be extremely difficult, if not impossible, to prove the annual motion of the earth.* DR. GOLDSMITH.

8. *IF IT WERE not for the fresh air, which is let into the pond, fishes would die, when the surface is frozen.* DR. GOLDSMITH.

But

But the expression *IT WERE*, without any hypothesis or condition annexed, is inadmissible: e. g.

9. *IT WERE TO BE WISHED, that men would lay aside all foolish projects, and consult the real happiness of themselves and their neighbours.*

We shall be convinced of the impropriety of this construction, by prefixing *if* to the words *it were to be wished*. The sense is not complete; for it is a positive unconditional proposition; and it ought to be in the mode, which grammarians term, the indicative. *It is to be wished that men would lay aside all silly projects*, is the proper expression.

The phrase, *I could wish*, is equally exceptionable, when the sentence is unconditional. The error is not in point of concord; yet I choose to notice it under the present section.

10. *I COULD WISH the greatness of a man was estimated according to his virtue and abilities.*

The author should have written, *I wish the greatness, &c.* There is no hypothesis, or reserve, to justify the admission of *could*. In the following instance, indeed, and upon all similar occasions, it is proper and necessary.

11. *He*

11. *He has so provoked me, I COULD wish him dead. I COULD kill him, were he not my child.*

The distinction is obvious. In the former instance, if we reject *could*, the expression will be full and nervous: if we dismiss it from the latter instance, it will indicate a wish that had no existence in the father's breast. Though he has so grievously provoked me, I do not desire his death—paternal feelings arrest my vengeance.

12. *The sun is in the center of our system; the planets which move round him are seven in number; and their names are as FOLLOW: Mercury, Venus, the Earth, Mars, Jupiter, Saturn and Georgium Sidus.*

It ought to be *follows*. Their names are as it here follows—as the account which follows. On most occasions it is more elegant to omit *as follows*. Were you asked the name of a man of war, it would be ridiculous to answer, *it is as follows*, the Alfred. If the question extended to several ships, it would be equally unnecessary to say, they are *as follows*, the Ganges; the Triumph; the Irresistible.

In justification of the phrase, it may be urged, that the true construction requires *follow*. The names are as *they follow*.

To



To which I reply, *as*, is a term of similitude: and the expression, *as they follow*, implies that the names are like themselves! But the names are *AS*, or *LIKE* the *account*—*as*, or like the *statement* which follows.

13. *The Cape of Good Hope, as well as many islands in the West Indies, ARE famous for hurricanes,*  
GOLDSLITH.

The Cape of Good Hope ARE!

14. *It is praise-worthy to abstain from injury; but that A'NT enough; you must also learn to do good.*

*A'nt* ought to be avoided; even when the construction admits a verb in the plural number. In the phrase before us, it makes a disgraceful solecism. To abstain from injury is praise-worthy; but that *are not* enough,

Let it be remembered by those economists, who desire to save ink and breath, by a prudent abbreviation of their phrases, that *a'nt* is the plural contraction, and *is'nt* the singular.

15. *There ARE a great variety of wines, which differ in colour, taste, quality and duration.*

DR. TRUSTLER.

Variety

Variety is not a plural noun, any more than quality, or duration.

Here ends my first section, and a very long letter, which you will do well to peruse, as often as convenient.

Be not discouraged, if you find a little difficulty on a first reading. Persevere. The whole will soon become familiar; and you will be amply rewarded for your attention.

I am sincerely your's.

## THE SECOND SECTION.

Dear Charles,

I SHALL begin my second section with remarks on the construction of verbs with nouns.

When the word TO is prefixed to a verb, that verb is said, by grammarians, to be in the infinitive mode; and to conform to the same rules of government as the noun: e. g.

1. TO ERR is human; to forgive divine.

To

*To* and *err* convey the same idea as *error*; and on that account, the verb which follows must be in the singular number.

And the same construction is proper, though the infinitive mode be followed by several other words: e. g.

2. *To be in a passion, is to punish yourself for the faults of other people.*

Here are not fewer than five words before *is*; but as they include only a single idea, *passion*, the sentence is correct.

3. *To be a benefactor to mankind, by propagating knowledge, requires some qualities not universally bestowed: but TO SPREAD suspicion; TO INVENT calumnies; TO PROPAGATE scandal; REQUIRES neither talents, nor labour, nor courage.*

It is here most truly and properly affirmed, that to spread suspicion requires no talents; to invent calumnies requires no talents; to propagate scandal requires no talents. But observe, the admission of *and* between the infinitive modes renders the construction ungrammatical: e. g.

4. *To be rich AND to be noble is not sufficient to procure the esteem of worthy men.*



If *and* were omitted, the passage would be accurate. *Affluence* is not sufficient to procure the esteem of worthy men; *nobility* is not sufficient to procure the esteem of worthy men; for a man may be affluent without nobility, or enobled without affluence; and, in either case, be denied the esteem of worthy men. But it is obviously the author's opinion, that nobility and affluence *united*, are sufficient to procure esteem; and therefore reason and the idiom of our language demanded a verb plural.

On subjects of importance, it is better to be diffusive than defective. I, therefore, repeat my former remark: whenever *and* occurs between two nouns, or two infinitive modes, the verb *must be* in the plural: even when the attribute may be affirmed of each noun separately; and on that account, if the *and* be omitted, it is always more *safe*, and frequently more *elegant* to insert it: e. g.

5. *Temperance, justice, fortitude, is a virtue.*

The full construction is—temperance is a virtue, justice is a virtue, fortitude is a virtue. In the abbreviated construction, the attribute and affirmation are omitted after temperance and justice; and, as there is no *and* in the sentence, the verb continues in the singular, after no fewer than three nouns. The author might have written—*temperance, justice,*

AND

AND *fortitude* ARE *virtues*. The *and* is never omitted to advantage, except after infinitive modes: because verbs singular are never elegantly used after several *nouns*, though they are frequently graceful after several *infinitives*.

But take particular notice, if one of the nouns be plural, it is indispensably necessary to use a verb plural, though there be no *and* in the sentence, and though the noun which immediately precedes the verb be singular: e. g.

6. *The stars, the sun* PROCLAIMS *his praise*.

How much more easy and natural it is to say, the sun and stars proclaim his praise! When we depart from established modes of expression, it is incumbent on us to prove, that we have reason and analogy to countenance our dissent. Admitting that the sun PROCLAIMS the praise of God, it may be demanded, what are the stars doing? It cannot be answered, THEY also PROCLAIMS his praise, for that is an error in concord. Nor can it be pleaded, that PROCLAIM is understood; because it is a rule founded on the nature of things, that a verb plural cannot be understood of a former noun, if a verb singular be expressed with the latter. It might have been written—the sun, the stars PROCLAIM his praise;

praise; for an individual may be included in a multitude, but not a multitude in an individual. *Proclaims* relates to *one*, *proclaim* to *many*.

The clock proclaims the noon of night.

Farewell.

Dear Boy,

NOTHING will so effectually expand and invigorate the powers of the mind, as CLOSE THINKING. Hence it is of the greatest consequence to form an *early habit of reasoning*. It was an excess of modesty, perhaps, in Sir Isaac Newton, to attribute his glorious discoveries to *patient attention*; but certainly, attention without genius, is preferable to genius without attention. It is not the time which a student spends at his books, but the art of confining his attention, of centering the powers of his mind to the business before him, which conduces to his real progress.

Now let me request you to turn your attention to a passage in Dr. Blair's Lectures on Rhetoric. *What the heart, or the imagination* DICTATE,  
always



*always flows readily.* We never use *or* in the sense in which it is here employed. Dr. Johnson, indeed, informs us, that *or* is a conjunction; and he adds, it is disjunctive. What an association of ideas! A *disjunctive conjunction*!

I am not competent to determine what impressions are made by *and*, and by *or*, on our friends, *North of the Tweed*, but with us, the most illiterate perceive the difference in a moment. A homely example will answer our purpose. In a country fair, if you say to a peasant, intrusted with the sale of some horses, *I will give you twenty guineas for this horse* AND *that*, the terms of purchase will be instantly comprehended, and the man will properly conclude, that he must deliver TWO horses, on receipt of the twenty guineas. If you say, *I will give you twenty guineas for this horse* OR *that*, he will immediately understand, that he is to receive twenty guineas on delivery of EITHER of the horses.

In England, a scholar expresses himself in this manner; *What the heart* AND *the imagination* DICTATE, *always flows readily.* *What the heart* OR *the imagination* DICTATES, *always flows readily.* That is, what either the heart dictates, or the imagination dictates, always flows readily. There is precisely the same impropriety (as to the analogy of

G

language)

language) in demanding a verb plural after OR, on the present occasion, as there would be in demanding two horses of the countryman instead of one.

Again from Dr. Blair, *An ostentatious, a feeble, a harsh, or an obscure style ARE always faults; and perspicuity, strength, neatness, and simplicity ARE beauties.*

The first clause of this sentence, namely, *An ostentatious, a feeble, a harsh, OR an obscure style ARE always faults*, may be pronounced inelegant, in every view. It's only merit consists in being an illustration of that *harshness* and *imbecility* which the Professor condemns.

*Style* is the nominative case; and if a thousand adjectives were before it, either connected or unconnected, a verb plural would be improper; for the words, *An ostentatious, and a feeble, and a harsh, and an obscure style*, are only equivalent to a *style ostentatious, and feeble, and obscure.*

*The greater part of mankind ARE corrupt in every condition; and differ in high and in low stations, only as they have more or fewer opportunities of gratifying their desires.*

Grammarians inform us, that certain nouns,  
which

which they denominate *collective nouns*, may be construed with a verb either *singular* or *plural*. But this is speaking at random, and contrary to the order and precision of nature. Let us examine this opinion.

*There ARE a MULTITUDE of men. There ARE a FLIGHT of birds. The ASSEMBLY ARE numerous. The MULTITUDE ARE great.*

As it is impossible to affirm of each man, that he is a MULTITUDE; of each bird, that it is a FLIGHT; of each member of the assembly, that he is NUMEROUS; of each individual, that he is a GREAT MULTITUDE; the verb ought to be singular, to correspond with the unity of the terms, *flight, multitude, assembly*.

The *singular* is frequently inelegant and unnatural: e. g.

*I have compassion on the MULTITUDE, said the Redeemer, for THEY HAVE nothing to eat.*

It is here affirmed of each individual of the multitude, that he has nothing to eat; and there being MANY individuals, the verb and pronoun would be incorrect if used in the singular.

A verb in the SINGULAR form is improper,  
G 2 when



when the word **PART** precedes a **COLLECTIVE** term.

A **COMMON** noun is incapable of being divided, without losing it's nominal essence; as a **CIRCLE**, a **SWARM**, an **ORANGE**. A **COLLECTIVE** noun is the bond which keeps many individuals in a state of union; as a **FLIGHT** of birds; a **FLOCK** of sheep; or a **MULTITUDE** of men.

If a multitude be separated into parts, every part will contain perfect individuals. But a segment is not equal to a circle; nor does a wing constitute a swan. Hence it is manifest, if the word *part* precede a **COMMON** noun, the verb must be *singular*: e. g. *The greater PART of that orange is decayed.* If it precede a *collective* noun, the verb ought to be *plural*: e. g. *The greater part of mankind are corrupt in every condition.* It is a distressing truth, but expressed with precision and elegance.

Adieu.



## Dear Charles,

I THINK you are now pretty well prepared to understand THE RULES OF CONCORD; and therefore shall immediately give you some with examples.

1. When the nominative is numerically ONE, the verb must be singular: e. g.

*God is love.*

*Learning EXCELS riches.*

*To obey God IS liberty.*

*To be governed by passion IS slavery.*

2. When the nominative is plural, the verb must be plural: e. g.

*Good men HATE sin from the love of virtue.*

3. When TWO or more nouns, or *two* infinitive modes, joined by *and*, are the nominative case, the verb must be *plural*: e. g.

*Soft words and hard arguments ARE the best weapons in controversy.*

This mode of construction is natural and elegant. Dr. Priestly's apology for a verb singular, when the terms contain *kindred ideas* is inadmissible. Kindred terms enfeeble the style. They are avoided

by all, who speak with elegance and precision. If used, they ought to conform to the general laws of syntax. They are not *one word*, because they contain kindred ideas. The Doctor might as well contend, that the Prince of Wales and the Prince of Denmark *is* one man, because they are *cousins*.

I do not know that any terms are more synonymous than *one* and *one*. Are they, on that account, only *one*?

I recommend an invariable observance of this rule. It is hazardous to deviate from it; and, in my opinion, absurd.

4. When *two* or more nouns, of the singular number, not joined by *and*, are the nominative case, the verb may be either singular or plural: e. g.  
*Omnipotence, justice, mercy* *is* an attribute of God.  
*Omnipotence, justice, mercy* *are* attributes of God.

5. If the nouns unite in the production of the attributes, the verb must be plural: e. g.

*Faith, practice, perseverance* *form* the Christian.

6. If either of the nouns be *plural*, the verb must absolutely be *plural*, though unconnected by *and*; and though the attribute may be affirmed of each noun separately: e. g.

*Powers,*



*Powers, riches, fame, ARE of uncertain duration.*

7. When *two* infinitive modes, not joined by *and*, are the nominative case, the verb is more elegantly used in the singular, than in the plural: e. g.

*To oppress the defenceless, to insult the afflicted,*  
BETRAYS a mean and cruel mind.

This, my dear boy, finishes the 2d. section: and with every good wish,

**I am your's most sincerely.**

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### THE THIRD SECTION.

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**Dear Charles,**

I BEGIN the third section, with remarks on words and phrases, elegant and vulgar.

*Grammatical construction* constitutes the first excellence of style.

G 4

*A happy*

J

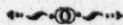
*A happy selection of words* is the foundation of the second excellence.

Take care, therefore, that your discourse be neither deformed by *solecisms*, nor disgraced by low and vulgar words; for nothing is so distinguishing a characteristic of low company, and bad education, as *vulgarisms*.

I hope you are sufficiently informed as to the *construction* of verbs. I now proceed to enumerate a few verbs which merit preference in point of elegance and precision.



### Cut a Figure.



To *make* a figure; to *make* an appearance, handsome or mean, are polite expressions.

*You are not angry with me for those JOKES which I CUT upon you yesterday; are you?*

In figurative language, a person may be said to *cut a figure*, in allusion to the business of a carver.

But

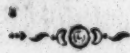
But if this be condemned as unpolite, surely to cut a joke ought to be cashiered as extremely vulgar. To *PASS* a joke, to *pass* censure, to *pass* compliments on a person, are proper.

TO CRACK A JOKE. This phrase is equally vulgar. It is used, I admit, by Pope; *He takes his chirping pint, and cracks his joke.* But you must observe, that poets often adapt their language to the state of the person introduced. Hence the most polite, and the most vulgar diction, may be found in the same poem.

In noticing the jocose propensity of a person, do not say, *He is fond of CRACKING his jokes*; but, *He is JOCOSE*; *He LIKES to joke*; *He is fond of SPORTING a joke*; for this is descriptive of a propensity to enliven discourse, by a witty and unexpected combination of ideas. But if his pleasure consist in *personal attack*, do not say, *He loves to CUT a joke upon a friend*, but, *He loves to PASS a joke upon a friend*; *He takes pleasure in POINTING a jest at a friend.*

To *pass* sentence and to *pronounce* sentence are synonymous. To *address* a sentiment to a person, and to *point* a sentiment to a person, are also synonymous and proper. But how a *remark* is to be cut and *crackt* I know not.





## Do you see.



*SOUNDS* are conveyed through water, DO YOU SEE, with almost the same facility with which they move through air.

It is by no means unpolite to request a person to inform you, whether he perfectly *comprehends* the terms of a question, or has a perfect *conception* of the subject in debate; but it is exceeding unpolite to reiterate *Do you see* in the sequel of your narrative, or the progress of your arguments. Suppose I were explaining to you the circumstances of the death of General Wolfe, as they are represented on his monument in Westminster Abbey, would it not be somewhat extraordinary, if I asked you, at every third word, *Are you blind?* e. g.

The expiring hero is attended by his aid-de-camp. Before him, *Are you blind?* is an Indian chief. That soldier, *Are you blind?* is shouting victory.

If distance, or the shades of night involve the object in obscurity, to which you desire the attention  
of

of a companion ; and if you request to know whether his external eye is adequate to distant and difficult discrimination ; in other words, whether he can *SEE the object*, it is no proof that you are deficient in breeding. But it is insufferable rudeness to question, every moment, the vigour and penetration of his mind.

Observe then, that, *Says I*, and *says she* ; *So says I*, and *so says he* ; *You see*, and *don't you see* ; *You know*, and *don't you know* ; *And so as I was saying*, &c. are to be avoided by all, who aim at decency of expression.

Adieu.

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Dear Pupil,

Now for the capital vulgarism,

**I have got.**

I GOT on horseback within ten minutes after I received your letter. When I GOT to Canterbury, I GOT a chaise for town. But I GOT wet through before I GOT to Canterbury, and I HAVE GOT such a cold, as I shall not be able to GET rid of in a hurry.

I GOT

I GOT to the Treasury about noon, but first of all I GOT shaved and drest. I soon GOT into the secret of GETTING a memorial before the Board, but I could not GET an answer then; however, I GOT intelligence from the messenger, that I should most likely GET one the next morning. As soon as I GOT back to my inn, I GOT my supper, and GOT to bed, and it was not long before I GOT to sleep. When I GOT up in the morning, I GOT my breakfast, and then GOT myself drest, that I might GET out in time to GET an answer to my memorial. As soon as I GOT it, I GOT into the chaise, and GOT to Canterbury by three; and about tea time, I GOT home. I HAVE GOT nothing particular for you, and so Adieu.

Every phrase in this extract is in popular and perpetual use; and you see, that all the events, from the birth of Time to this moment, may be detailed without the help of a single verb, GET excepted.

This verb is of Saxon origin; ARRIVAL at the place of destination, the primitive idea; hence ACQUISITION; and hence POSSESSION. With the latter idea, it is used improperly in construction with *have*. *I have GOT*; in other words, *I have HAVE*: e. g.

I HAVE



I HAVE GOT a father ninety years old.

For obvious reasons, *I have got a father* must be restricted to, *I possess*; consequently, it is absurd to prefix *have*; *I have possess*!

It may, therefore, be advanced as a general rule, when *possession* is implied, it is vulgar to use *have* in construction with *got*.

Our ancestors have furnished us with innumerable terms to express all the ideas, which the vulgar affix to their *fac totum*—*got*.

Are you in quest of any thing? Do not exclaim *I have GOT it*. But say, *I have FOUND it*; *I have it*, or *Here it is*, &c.

Again. *I mounted my horse*, or *I was on horse-back* within ten minutes after *I received* your letter: as soon as *I arrived* at Canterbury, *I engaged* (or *hired*) (or *stept into*) a post chaise for town. *I was* wet through before *I reached* Canterbury, and *I have* (or *I have taken*) such a cold as I shall not easily *remove* (or *cure*.)

*I arrived* at the Treasury about noon, being previously shaved and dressed. I soon *discovered* the secret of *introducing* a memorial to the Board; I could not, however, *obtain* an immediate answer; but

but the messenger told me, that I probably should receive one, next morning. *I returned to my inn, sup't, went to bed, and slept well. I rose early, and drest immediately after breakfast, that I might be in time for the answer to my memorial. As soon as I received it, I took post chaise, reached Canterbury by three, and my home about tea-time. I have nothing particular to add. Adieu.*

It was not my design to paraphrase the extract in terms of elegance; I only wished to prove, that persons of common education might express the usual occurrences of life, without the aid of *get*, and *got*, and *I have got*, &c.

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**This house to Let.**

**This house to be Let.**

**This house to Lett.**

**This house to be Lett.**

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Concise forms of expression are very proper in familiar intercourse, provided they neither cause *obscurity*, nor infringe any rule of *grammar*.

The full construction of this example is—*This house is to be LETTED*. No obscurity arises from the omission of *is*, or from the abbreviation of

LETTED

LETTED—Letted being the same to lett, as dressed to drest. But the T is no less essential in LETT, than the T in DREST.

The house is *passive* on this occasion, and therefore the presence of BE after TO is indispensable. There is no instance in our language, to countenance the omission.

The first example is improper, because it makes the house ACTIVE. This house to let—to let what? The proprietor? This house, I presume, is to BE LETT BY the proprietor.

The second example is improper, because it has the verb active LET after the passive SIGN BE.

The third example is not correct, in consequence of omitting BE.

The fourth example is proper. You may omit *This house*, and write TO BE LETT. But take care that you never prefix, *These premises; These premises to be lett*. When houses or estates have been described (suppose in an advertisement) you may subjoin, *The PREMISES may be viewed, The PREMISES are to be lett, The PREMISES are to be sold, &c.* instead of saying, *The above house and gardens,*



er, *The above estate, may be viewed, lett, or sold, &c.*

*The ABOVE HOUSE to be sold, may be affixed to a habitation with as much propriety as, These premises to be sold.* This is a long letter.

Farewell.

Dear Charles,

THE higher we ascend, the wider opens the horizon to our view—and though you may think I have written a great deal, you must not be surpris'd, when I tell you, there remains more to be done.



Propose.



*I PROPOSE to give a general view of the chief principles relating to this subject.* DR. BLAIR.

WE PROPOSE doubts, questions, and projects to others.

*We*

WE PURPOSE what we intend to do of ourselves.

Who would say, *I PURPOSE that the thanks of this court be given to Mr. Oswald?* or I PROPOSE to give my vote to Mr. Bowgin?



### Catch.



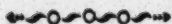
*When the whole meaning must be CATCHED from the mouth of the speaker, great conciseness is to be avoided.*

DR. BLAIR.

Persons well educated, never use the word CATCH. If a man be in pursuit of another, they say, he will OVERTAKE him, instead of CATCH him. And, we have CAUGHT or TAKEN cold, instead of, we have CATCHED cold. You will be CAUGHT or DETECTED, instead of you will be CATCHED. Thief-taker, not thief-catcher.

To CATCH the meaning from the mouth, is a style of speaking not sufficiently dignified and refined to be admitted into lectures on eloquence. I do not deny that we have similar phrases in England; for our vulgar frequently exclaim—*Let us have none of your jaw; I know your MEANING by your GAP-ING.*

H



## Persecute. Prosecute.



*He was PERSECUTED for FORGERY.*

I can assign no reason but custom, for the appropriation of PROSECUTE to judicial proceedings, and PERSECUTE to extrajudicial.

Legal PROSECUTION is founded on a complaint of civil injustice. The *offence* is the object of pursuit, not the *offender*.

PERSECUTION is *personal*, and arises from enmity.

As no judge on the bench, no gentleman at the bar, ever talks of PERSECUTION for murder, forgery, or any offence against the laws, it is absolutely necessary to conform to the established distinction.



## To Learn. To Teach.



The master *teaches*. The scholar *learns*.



## Read, nor Write.

*Literature was so little known from the ninth to the fourteenth century, that few men could either*  
 READ OR WRITE. DR. TRUSTLER.

It is unnecessary to add, that a person cannot WRITE, after you have informed us that he cannot READ. A person may be able to READ, though not to WRITE, and therefore it should be thus expressed, He can neither *write* nor *read*.

## Bred and Born.

Some author, I do not recollect his name, has condemned this arrangement with great severity. It is unquestionably more proper to name the place of BIRTH prior to that of EDUCATION.

## It can't be hoped.

HOPED, in this phrase, is a corruption of the antient word HOLPED, HOLPEN. It is a common  
 H 2 exclamation

exclamation after an accident, *It can't be hoped*; that is, no aid, no effort can *prevent* the loss sustained. I would recommend, it is *unavoidable, irretrievable, inevitable*, according to the exigency.

~~~~~  
**Called.**  
 ~~~~~

WE CALL to a person when we desire to engage his attention; and we usually CALL him by his name. Hence, in popular phraseology, *He is called*, so and so: but I prefer *named*.

I am

**Your very affectionate Friend.**

~~~~~  
**I wonder.**  
 ~~~~~

**My Dear.**

A FEW years since, a person, naming himself Dr. Katterfelto, travelled through the country with WONDERS! WONDERS! WONDERS! and I once attended, what he termed, a Lecture on Magnetism, but saw nor heard any thing *surprising*; himself

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*I won  
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himself excepted; who was, I believe, the most impudent, as well as the most ignorant of men. The populace are accustomed to use I WONDER on very improper occasions: e. g.

*I wonder what's a clock! I wonder whether it will rain to day!* With equal propriety you may say,

*I ADMIRE what's a clock! I am ASTONISHED whether it will rain to day!*

A person of education enquires, *What's the hour? Will it rain to-day?*

I WONDER *the man is so inactive*, is a proper expression, and equivalent to, *I am SURPRISED the man is so inactive.*

*I WONDER whether they will conquer the Turks*, is improper, and equivalent to, *I am surprised whether they will conquer the Turks.* On such occasions, it is more correct to say, *I am unable to determine: I am at a loss to conjecture; I am in doubt; I wish to know, &c.*

If you can substitute *I am surprised*, or *I am astonished*, for *I wonder*, the phrase is English; if you cannot, it is a barbarism.



❦

## Ought. Aught.

❦❦❦

*THE late Mr. Shaftoe, in 1759, rode fifty miles in one hour and forty nine minutes; the greatest feat of the kind, for OUGHT I know, ever performed.*

It should be, for AUGHT I know; meaning, for any thing I know.

*The fore-wheels of all carriages OUGHT to be so high, that their axles may be even with the breast of the horses.*

This expression is proper, for OUGHT is a verb.

❦❦❦❦❦

## Lie. Lay.

❦❦❦

THE neuter verb LIE is frequently confounded with the active verb to LAY; to avoid the impropriety,

priety, remember that LIE, LAY \* and LAIN have no accusative case expressed; thus,

Present tense,     *I LIE on the sofa.*  
 Imperfect tense,   *I LAY on the sofa.*  
 Perfect tense,      *I have LAIN on the sofa.*

But LAY, the active verb, has an accusative case expressed; thus,

Present tense,     *I LAY him on the sofa.*  
 Imperfect tense,   *I LAID him on the sofa.*  
 Perfect tense,      *I have LAID him on the sofa.*

Here, my dear boy, is the end of my present observations; but you shall hear from me again very soon.

**Adieu.**

\* I mean the past tense of lie.



---

Dear Charles,

I HAVE closed my series of critical observations, but am unwilling to terminate my correspondence, without giving you a little counsel for the government of your time, and for your future welfare. In the first place, let me advise you not to waste your youth, your best season of improvement, in trivial amusements; because you will find ignorance in age not only a severe mortification, but a real evil. Let me see you desirous to make the most of your abilities; and suffer not a false opinion of your capacity to be a discouragement in your endeavours after information. A common understanding, with well-directed application, will go further than a lively genius, attended by that impatience which generally accompanies quick parts. It is not from want of ability that some men are such trifling companions—so little qualified for the friendship of the sensible; it is oftener from the neglect of exercising talents which they really possess, and omitting to cultivate a taste for intellectual attainments. The means of knowledge are easily found by those who seek them; and their labour will

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will be abundantly rewarded. But, my Charles, my affection for you extends it's views beyond this transitory existence; it considers you a candidate for immortality; and sees with solicitude the dangers that will surround you. Be on your guard; for you will meet with fires of various kinds (doubt it not) to tempt you out of your course. Let religion govern your actions; and study to regulate your heart by the true spirit of Christianity. The pursuit of knowledge, guided by religion, conduces to many valuable ends; it will give you the habit of industry; it will qualify you for the nobler kinds of friendship; and constantly promote in you candour and liberality. While I have endeavoured to apply to your advantage what my experience could furnish, my heart was animated by hopes which I earnestly pray may be rewarded. With joy should I see you shine a bright example of all that is excellent, and grateful would be the reflection that I had, in some measure, contributed to make you so.

*My dear Charles, Adieu.*





## Definitions of Terms,

USED IN

## Science.



**Geometry**, from *γη*, *gè*, the earth, and *μετρον*, *metron*, to measure.

**Technical**, from *τεχνικος*, *technikos*, belonging to arts.

**Problem**, *προβλημα*, *problema*, from *βαλλω*, *ballo*, to throw, and *προ*, *pro*, before; i. e. to propose, or set before: a proposition which proposes something to be done; as to bisect a line, &c.

**Arch**, from *arcus*, a bow, *Lat.* and, when used in geometry, implies any part of a circumference of a circle.

Indefinite

**Radius**,  
circle to  
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**Angle**,  
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**Vertical**  
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**Indefinitely**, without bounds.

**Radius**, a right line drawn from the center of a circle to it's circumference. This right line, I conceive, answers to the rays of light, (in an optical sence) which, falling upon the eye every where in right-lined directions, form a horizon to our sight.

The term **Scale** seems to have been derived from the *Steel-yard* and it's divisions marked on the beam, to adjust the different degrees of weight by.

**Angle**, from *ἄγκυλος*, *ankulos*, the bending of the elbow; and in geometry, implies the point in which two lines meet.—But the quantity of an angle is the space comprehended between the two lines meeting in a point, and it's proportion is expressed by degrees; which term **Degree** means simply the three hundred and sixtieth part of a circle, whether great or small.

**Vertical**, placed in a direction perpendicular to the horizon.

**Sector**, so called, because when opened, it comprehends a portion of a circle between two semi-diameters, making an angle at the center.



**Polygon**, from *πολυς*, *polus*, many, and *γωνια*, *gonia*, a corner ; having many corners or angles.

A line is said to be **Bisected**, when it is divided into two equal parts ; from *bis*, twice, and *sectum*, cut in two.

**Tangent**, from *tangens*, Lat. touching.

**Superficies**, *superficies*, Lat. the surface of any thing ; an extension which has length and breadth, but no thickness.

**Obtuse**, signifies blunt, and

**Acute**, sharp.

**Convex**, the outer curve of an arch,

**Concave**, the inner curve of an arch.

**Spherical**, something like a globe.

**Pentagon**, from *πεντε*, *pente*, five, and *γωνια*, *gonia* ; a five-cornered figure. The other *Polygons* have all their

their part  
the Greek

Hera  
Hepta  
Octa  
Non  
Deca  
Unde  
Duode

Segment

Ellipsis  
If a super  
it, if one  
other, the  
figure is

Periphe  
bear or c  
radius ab  
cumferen

Cube,

Heraedr  
can be n

their particular names formed in the same way, from the Greek numeral adjectives.

|             |   |                |   |    |   |         |
|-------------|---|----------------|---|----|---|---------|
| Hexagon,    | } | because it has | } | 6  | } | angles. |
| Heptagon,   |   |                |   | 7  |   |         |
| Octagon,    |   |                |   | 8  |   |         |
| Nonagon,    |   |                |   | 9  |   |         |
| Decagon,    |   |                |   | 10 |   |         |
| Undecagon,  |   |                |   | 11 |   |         |
| Duodecagon, |   |                |   | 12 |   |         |

**Segment**, from *Segmentum*, a piece cut off.

**Ellipsis**, from *ελλειπσις*, *elleipsis*, a defect or omission.

If a superficies be apparently round, but on measuring it, if one of it's diameters be found shorter than the other, there is then a defect, and we say that the figure is elliptic.

**Periphery**, from *περι*, *peri*, about, and *φερω*, *phero*, I bear or carry; which alludes to the hand bearing the radius about it's center, in order to describe the circumference of the circle.

**Cube**, from *κυβος*, *kubos*, a die; sometimes called an

**Hexaedron**, because it has six bases, on which it can be rested; *εξ*, *hex*, and *εδρα*, a seat.

**Prism**, from *πρισμα*, something cut off.

**Tetrahedron**, from *τετρα*, *tetra*, four, and *εδρα*, as before. It may be considered as a triangular pyramid of four equal faces.

**Pyramid**; the learned are divided in their opinions about the derivation of the term *pyramid*: some think the name is from *πυρ*, *pur*, fire, because pyramids ascend to a point like fire; but others more confidently affirm, that it is from *πυρος*, *puros*, wheat, or corn. Not, says the author of the last opinion, that we are to suppose that the pyramids were ever intended for granaries; but that when the Greeks visited Egypt, and saw those amazing structures, they looked on them as store-houses for grain; and knowing Egypt to be a country fruitful in corn, they called them *Pyramids*—corn store-buildings; being, as they thought, the repositories for all the produce of Egypt.

**Cylinder**; this figure is represented by a garden roller, whence it's name *κυλινδρος*, *kulendros*, a roller.

**Hemisphere**, from *σφαيرا*, *sphaira*, a globe or sphere, and *ημισυς*, *hemisus*, half, i. e. half a globe.

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**Section**, a cutting, from *secò*, to cut.

**Architecture** implies the science of building in general, which gives rules for designing and raising all kinds of structures. It is from the word architect, compounded of *αρχος*, *archos*, the principal, and *τεκτων*, *tecton*, chief artificer; or one who gives rules for, and directs the management of buildings.

**Plinth**, from *πλινθος*, *plinthos*, a brick, or flat square stone, on which columns, in their most antique state, are supposed to have stood.

**Dado or Die**: so called, because it is of a cubical form.

**Cornice**, from the Latin *coronis*, a crowning; because the cornice is the crowning of the pedestal.

**Base**, from *βασίς*, a foundation for the column.

**Shaft**, is that long and straight part of a column, comprehended between the base and capital.

Some derive it from *σκαπτο*, *skapto*, to dig in the manner of a well, round and deep, whose inside resembles the shape of a pillar; and some, from the long part of an arrow or shaft. The shaft of a mine

is the round, perpendicular passage they make to come at the ore.

**Capital**, from κεφαλη, *kephale*; or *caput*, the head, which the capital is to the column.

**Architrave**, is so called, because it is the chief support to the whole entablature, from αρχος, *archos*, chief; and the Latin *trabs*, a beam.

**Freeze**, from φειβρον, *phibron*, a border or fringe; what the ancients used to call ζωφορος, *zophoros*, because it was usually enriched with the figures of animals.

**Fillst**, from the French word *fil*, thread.

**Cymatium**, or *cyma-recta*, from κυματιον, *kumation*, a wave; because this member resembles the swelling and concavity of a wave.

**Ovolo**, or Latin, *ovum*, which means an egg; because this member, in the Ionic, Composite, and Corinthian orders, is generally carved in the shape of eggs and darts.

**Cavetto**, from the Latin *cavus*, hollow.

**Abacus**, from αβαξ, *abax*, a shelf or table; or, as some suppose, a tile on which the ancient Greek mathe-

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mathematicians strewed dust to draw their geometrical schemes on.

**Astragal**, from *αστραγάλος*, *astragalos*, a bone of the heel; or the curvature of the heel, which this member resembles.

**Apophyte**, from *αποφυγη*, *apophuge*, escape; because that part of the column appears to fly off.

**Torus**, from *τορος*, *toros*, a cable, which this member resembles.

**Triglyphs**, from *τριγλυφός*, *trigluphos*, three engravings. It is compounded of *τρι*, *tri*, three, and *γλυφω*, *glupho*, to carve or engrave; in conformity to which derivation, the *triglyph* has two entire channels, and two half ones, with three spaces between.

**Volute**, from the Latin *volvendo*, to roll round, as on a staff.

The term *volume* has the same origin, because anciently they formed books with sheets of written parchment or bark, rolled round a stick.

**Dentils**, from *dentelli*, teeth, which they resemble; and the flat member on which these dentils are placed, is termed *denticulus*.



**Pupil**, in general, means a youth, under the tuition of a master; but why it has been introduced into optics, and applied to the small opening of the eye which receives the light, is owing to the little image, or *pupilla*, a puppet, which is reflected in the eye, and seen by every one who looks steadily on it, being no other than the spectator himself, whose image in miniature is reflected on the crystalline humour.

**Retina**, from *rete*, a net; because this part of the eye is a fine expanded membrane, somewhat open like a net, and spread over the bottom of the eye, on which are painted the pictures of all the objects we perceive.

**Horizon**, from *οριζω*, *horizo*, I limit or bound; viz. the sight.

**Subtend**, from *sub* and *tendo*, I stretch.

**Radial**, from *ραβδος*, *rabdos*, or radius, a ray of light.

**Elements**, from the Latin *elementum*, the first rudiments of any science.

**Catoptrics**, from *κατοπτρον*, *katoptron*, a mirror or looking-glass. Catoptrics teaches the science of reflex vision, and optics that of direct vision, though in the general and extensive meaning of the term

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**OPTICS**, from *ὀπτομαι, optomai, I see*, it includes in it whatever relates to sight, or the doctrine of vision; and therefore must imply **DIOPTRICS** also, which teaches the properties of refracted vision; that is, when rays of light pass through one medium into another, as through air into water.

**Tripod**, of *τρεῖς, treis, three*; and *ποδῖον, a foot*. Anciently the word tripod used to be applied to a kind of sacred three-footed stool, on which the heathen priests were seated to receive and deliver their oracles; from which we may learn how time alters words; any fire-screen or three-legged stool, is now called a *tripod*.

**Iconology**, from *εἰκον, eikon, an image*, and *λέγω, lego, I speak*. The interpretation of ancient images, monuments, and emblems.

**Democracy**, from *δῆμος, demos, people*; and *κρατεῖν, kratein, to govern*; is when the sovereign power is lodged in the body of the people.

**Aristocracy**, from *αἰστος, aristos, the best*, and *κρατιω, kratio, I command*; is when the supreme power is lodged in a senate, composed of the principal persons of a state, either for their nobility, capacity or probity.

**Monarchy**, from *μονος, monos, alone*; and *αρχη, arche, government*; is when the supreme power is invested in one person, commonly termed the King.

## *An Outline of Geography.*

A man, by the help of Charts, Books, Maps and Masters, may become an excellent geographer, without stirring out of his elbow chair.

DR. HENRY.

### GEOGRAPHICAL TERMS Explained.

#### LAND.

**A Continent** is a large tract of land, not separated by an ocean: as *EUROPE*.

**An Island** is land surrounded by water: as *Great Britain*.

**A Cape** is land running into the sea: as *the Cape of Good Hope*.

**A Peninsula** is land, almost surrounded by water: as *the Morocco*.

**An Isthmus** is a neck of land which joins a Peninsula to a Continent: as *the Isthmus of Suez*.

**A Coast** is the edge of land which is next the sea.

#### WATER.

**An Ocean** is a large extent of waters not separated by land: as *the Atlantic*.

**A Lake** is water surrounded by land: as *the Lake of Geneva*.

**A Bay** is the sea running into the land: as *the Bay of Biscay*.

**A Gulph** is the sea almost surrounded by land: as *the Gulf of Venice*.

**A Strait** is a narrow passage, having land on each of it's sides: as, *the Straits of Gibraltar*.


**A Road** is a place of good anchorage for ships.






# GEOGRAPHY


IS a description of the earth.



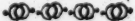
## General Map of the World.



IN this map, the top is the north ; the bottom, the south ; the part on your right hand, the east ; and the part on your left hand, the west.

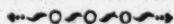


**Poles.** That part of the *top* marked 90, is called the *North Pole* ; and that part of the *bottom* marked 90, is called the *South Pole*.



**Circle.** When any circle is spoken of in a mathematical sense, it is supposed to be divided into 360 equal parts, called degrees ; and every degree is also supposed to be divided into 60 equal parts, called seconds.

**Hemispheres.** The earth is a globe; or, as some call it, a sphere; consequently, half of the earth is half a sphere; to speak more scientifically, half of the earth is a *Hemisphere*. Now, these two large circles represent the two hemispheres of the globe, supposing it cut into two equal parts.



**Horizon.** The broad yellow circles which surround these two hemispheres, represent the *Horizon*; that is, an imaginary circular line, which would divide the visible from the invisible half of the earth, supposing you were raised so far above the earth, as to see one-half of it.



**Equator.** That straight line which passes through the middle of each hemisphere, is called the *Equator*—because it equates them; that is, because it divides them into equal parts.



**Tropics.** The thick, black circle which passes over New Holland, and that which you see at the same distance from the equator, on the north side, are called the *Tropics*.

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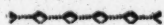
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**Polar Circles.** The other thick circles near the north and south poles, are called the *Polar Circles*.



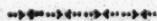
**Zones.** The tropics and polar circles limit the *Zones*: thus,

The space between the tropics, is the *Torrid Zone*.

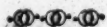
The spaces between the tropics and polar circles are the *Temperate Zones*.

The spaces within the polar circles are the *Frigid Zones*.

Torrid means burning,  
Temperate means moderate, and  
Frigid means frozen.



**Meridians.** These circles which you see meet in both poles, are called *Meridians*: they pass through every fifteenth degree of the equator, marking the longitude.



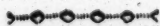
**Longitude.** By this, I mean, the distance east or west from any particular meridian, counted on the equator, and never exceeding 180°. In English maps,



maps, the first meridian is generally placed at Greenwich, but the map before you, begins it's first meridian at the island of Ferro.



**Latitude.** Every circle (as has been said) contains 360 degrees; consequently, every half-circle contains 180 degrees, and every quarter-circle, 90 degrees: therefore, from the equator to the north pole, being a quarter-circle, there are 90 degrees; and likewise from the equator to the south pole, being a quarter-circle, there are 90 degrees. Now by *Latitude* is meant the distance from the equator, either north or south, never exceeding 90 degrees; and the curve lines which are drawn from every 10th degree on the horizon, are called *Parallels of Latitude*.



**The four Quarters.** The first great divisions of the earth are called the four quarters of the world: namely,

### Europe, Asia, Africa and America.

The northern hemisphere is occupied by Europe, Asia, the greatest part of Africa, and North-America.

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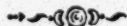
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In the Southern-Hemisphere, we find no land except South-America, part of Africa, New-Holland, and islands in the Pacific Ocean.

When our ships go to the East Indies, or come from thence, they water at St. Helena, and touch at the Cape of Good Hope: now look on the map, and you will find that St. Helena is about  $11^{\circ}$  E. long. and  $15. 55$  S. lat. and the Cape of Good Hope will be discovered at the southern extremity of Africa,

Other remarkable places are New-Holland and Nootka Sound. On the S. E. coast of New-Holland you will see Botany-Bay: and on the West coast of North America, in lat.  $50^{\circ}$  you will lay your finger on Nootka Sound; lately the bone of contention between us and Spain.



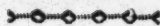
**Atlantic.** Before you quit this map, take notice that the sea between Europe and North America is called the Atlantic.



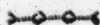
**Pacific Ocean.** That collection of waters between America and the east coast of Asia, is called the *Pacific Ocean*.



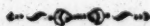
**Great South Sea.** That sea, which occupies the greatest part of the southern hemisphere, is called the *Great South Sea*.



# EUROPE.



THIS map before you is the Europe we have already seen, but it is drawn on a larger scale. Here, the degrees of latitude on the sides, and the degrees of longitude at the top and bottom are much larger. By these means, Europe becomes as large as the whole world; and as these degrees may be extended to any size, a kingdom may be magnified to appear as large as Europe: or a province as large as a kingdom.



**Bounded.** Europe is bounded  
 On the E. by Asia.  
 On the W. by the Atlantic.  
 On the N. by the Frozen Sea; and  
 On the S. by the Mediterranean.



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**Mediterranean.** The Mediterranean is a principal object in this map; and deserves your consideration: for

It washes the coasts of  
Spain,  
France,  
Italy, and  
European Turkey.

It contains the islands of  
Ivica,  
Majorca,  
Minorca,  
Corfica,  
Sardinia,  
Sicily,  
Candia, and  
Cyprus; besides the small islands  
of the Archipelago; and others in the Gulph of  
Venice.



**Scale.** If you apply your compasses to that scale of English miles, and then stride them from one end to the other of the Mediterranean sea, you will find it about 2000 miles in length.

With your compasses thus extended you can measure the kingdoms in this map; or the distance between any two places.

**Size of Kingdoms.** The map being coloured, you immediately perceive the size and situation of the several kingdoms. You observe the wonderful extent of the Russian Empire; and the remainder of that empire you will find covers an equal proportion of Asia.



Sweden, though not very powerful, is next in size: and the following differ not materially in dimensions: namely,

France,  
Spain,  
Germany,  
Poland\*,  
Denmark and Norway,  
Turkey,  
Great Britain and Ireland,  
Italy and its appendages,

The smaller states and kingdoms are,

|               |   |           |
|---------------|---|-----------|
| Holland †,    | } | States.   |
| Switzerland.  |   |           |
| Portugal, and | } | Kingdoms. |
| Prussia.      |   |           |

But you are not to estimate the territories of his Prussian Majesty by the size of his *kingdom*. Be-

\* Poland has lately been dismembered, and divided between the Empress of Russia, the Emperor of Germany, and the King of Prussia.

† Holland, at present, bows to France.

fides

sides that, he is Elector of Bradenburgh, in Germany, where you will find Berlin his capital. To these the last King of Prussia added part of Silesia in Germany, in 1742.

Sometimes in conversation you may wish to recollect the latitude of the principal cities in Europe: the best method of fixing this in your memory, is to trace with your finger those cities that lie in, or near the same parallel; thus,

Beginning with lat.  $41^{\circ}$ , on the W. side of the map, (and passing a little above the line 40) you will first touch upon Oporto in Portugal; thence travelling eastward, you will pass through Madrid, the capital of Spain; thence, over the island of Sardinia to Naples in Italy; and thence to Constantinople.

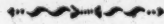
These cities therefore lie in, or very near, the same degree of latitude.

If you move your finger up to 48, and proceed eastward, as before, you will pass through

Paris,  
 Manheim,  
 Ratisbon,  
 Near Vienna,  
 Presburg,  
 Through the N. of Hungary and  
 The S. of Russia.



About the latitude 52, you will find  
 London,  
 Amsterdam,  
 Brunswick,  
 Berlin, and  
 Warsaw.



In 56 (passing from W. to E. on the same parallel) you will travel through

Edinburgh,  
 Copenhagen, and  
 Moscow.



Petersburgh, the capital of the Russian Empire,  
 lies in 60°, the latitude of the Shetland islands.



**Inland Seas.** Besides the Mediterranean, there are  
 two other inland seas.

The Baltic, and  
 The Black Sea.

The Baltic Sea communicates with the German  
 Ocean, through the Categate.

On

On the coast of the Baltic, there are several towns which deserve particular notice; as you find them frequently mentioned in the public papers.

The Black Sea communicates with the Mediterranean, by the Archipelago.

The ports of the Black Sea merit attention, on account of the late war between the Russians and Turks.



**Rivers.** The Volga rises in Moscow and falls into the Caspian Sea, at Astrachan.

The Don's source is not far from that of the Volga, but it runs into the sea of Asoph.

The Danube and the Rhine take their rise in, or very near Switzerland.

The Danube takes an eastern course, and after passing through Germany, Hungary and Turkey, falls into the Black Sea.

The Rhine takes a contrary direction; runs through Germany and Holland, and empties itself into the German Ocean.

Rivers

Rivers of less note are

The Elbe at Hamburg,  
The Tagus at Lisbon,  
The Thames at London, and  
The Rhone in France; which last  
falls into the gulf of Lyons, near Marfeilles.

**Great Britain.** As to our island, you see it lies between 50 and 60 degrees of N. latitude: and that on the E. it is separated from the Continent, by the German Ocean—on the W. from Ireland, by St. George's Channel—and on the S. from France, by the English Channel.

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# A S I A.

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In *Asia*, as in Europe, the Russian dominions cover the largest space.

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**Kamschatka and Siberia.** In this vast territory, there are few objects worth remembering, except *Kamschatka*, (which is mentioned by some of our northern

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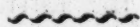
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ern navigators) and that inhospitable region, called Siberia, to which Russian malefactors are banished.

Kamschatka lies in between  $55$  and  $60^{\circ}$ ; the latitude of Scotland.



**Tartary, Arabia and Persia.** With Tartary we have no concern: with Arabia and Persia almost as little.



**Turkey.** In Turkey (at the east end of the Mediterranean) you find Smyrna and Aleppo. These places are well known to our merchants trading to Turkey. You also find Jerusalem there; and other towns mentioned in scripture.

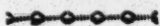


**India.** We will now proceed to India, and trace the coast from Surat (on the W. side) to the mouths of the Ganges; at the eastern extremity we shall pass Bombay, Goa, and thence along the coasts of the Carnatic, Malabar, and Coromandel, till we come to Pondicherry, Madras, and so on to Calcutta.

Passing to the south of the equator, we sail between the islands of Sumatra and Java. Leaving the Dutch settlement of Batavia on the right, we  
K proceed

proceed directly N. to Canton, in China, and thence to Peking, at the northern extremity of the Chinese Empire.

That part of India with which we have any connection, lies within the torrid zone, and consequently is excessively hot.



**Islands.** The several clusters of islands in this map are those of

Japan,  
Sonda,  
The Philippines,  
The Ladrons,  
The Moluccas or Spice-Islands, and  
The Maldivias.



## A F R I C A.



AFRICA forms a very considerable part of the habitable globe. Hitherto Africa has been so imperfectly explored, that in any part of it our knowledge extends but to a small distance from the coasts.

**Bounded.** Africa is bounded,  
 On the E. by the Indian Ocean;  
 On the W. by the Atlantic;  
 On the N. by the Mediterranean; and  
 On the N. E. by the Red Sea.



**Extends.** Africa extends about 5000 miles: viz.  
 From  $37^{\circ}$  N. latitude,  
 To  $35^{\circ}$  S. latitude: the equator running  
 nearly through the middle of it.



**Coast of Barbary, &c.** If you begin at the Straits  
 of Gibraltar, at the N. W. corner of the map) and  
 follow the S. coast of the Mediterranean, you come  
 to

Algier, then to  
 Tunis, and then to  
 Tripoli; which are the only places  
 of consequence on the coast of Barbary.

Continuing your journey eastward, you arrive at

**Alexandria, in Egypt.**

And passing the mouths of the Nile, you come to



## Grand Cairo.

Thence travelling with the celebrated Bruce, between the Nile and the Red Sea, you traverse

## The Kingdom of Nubia ;

and arrive in

## Abissinia.

From thence (still following the coast) you will not find a name that you have ever heard before (or that deserves to be remembered), till you come to

## The Cape of Good Hope.

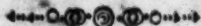
This is a Dutch settlement in the country of the Hottentots ; a people with whom we begin to be better acquainted, since the publication of some late travels into this part of the world.

Having doubled the Cape, you proceed northward, till you come to

## The Coast of Guinea.

Thence you pass the rivers Gambia and Senegal, on the Negro-coast, leaving (a little to the W.)

Cape de Verd islands ; then  
The Canaries ; and lastly,  
The Island of Madeira.



**St. Helena and Ascension.** On the S. of the Equator, at a considerable distance from the continent, you see two small islands :

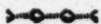
St. Helena, and  
Ascension ; both in the track of our  
East-India ships.



**Madagascar.** There is also an island on the E. coast of Africa, called Madagascar, which is too large to have escaped your notice.



## A M E R I C A.



THIS map of the continent of America, and of the West-India islands, requires to be studied with attention ; particularly N. America : as without a competent knowledge of that country, you cannot possibly understand the history of your own times.



**N. America.** N. America lies between the northern extremity of *Hudson's Bay*, and the *Gulf of Mexico*.

**New South Wales.** Between the latitude 55 and 50 you will find New S. Wales and Labrador; these are very cold, though in the same latitude as England.

**Canada.** From 50 to 45 you have Canada, Nova Scotia and Newfoundland: these are likewise extremely cold, though in the latitude of France.

**New England.** Between 45 and 40 lies New England.

Thence you proceed southward through

Jersey,  
 Pennsylvania,  
 Maryland,  
 Virginia,  
 N. and S. Carolina,  
 Georgia, and  
 Florida.

Westward of these you observe  
 Louisiana, and

The vast kingdom of Mexico, extending southward as far as Panama, within 7 degrees of the equator.



**S. America.** From Panama, down to Cape Horn, you pass no places of note, except Lima, the capital of Peru; whence the Spaniards import gold, and (what is more intrinsically valuable) the *Cortex Peruvianus*.

**Juan Fernandes.** In latitude 33 you leave, a little to the W. the island of Juan Fernandes, rendered famous by Anson's voyage.

**Paraguay.** You now double the Cape, and passing Falkland's Island, proceed northward along a desert coast till you come to Buénos Ayres, at the mouth of the great river Paraguay, which runs through an extensive country named Paraguay.

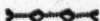
**Brasil.** You are now arrived at the Brasil, a large country; the coast of which is in possession of the Portuguese.

**Surinam.** Having doubled *Cape St. Rouge*, and passed the vast river of the Amazons, you touch at the Dutch settlement of Surinam, and thence proceed

ceed by the coast till you come to Curacao; an island also in possession of the Dutch.



**I. of Curacao.** From this island the Dutch import that superior species of Tobacco, which they call Kanafter or Varinas; the last is the name of a town on the Spanish Terra-firma, in the neighbourhood of which this tobacco is cultivated by the inhabitants, who barter with the Hollanders for European goods,

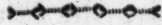


**Carthagena and Portobello.** From Curacao we continue our coasting voyage till we arrive at Carthagena and Portobello: names that were once familiar to every individual in Britain.

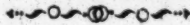
Portobello was taken by Admiral Vernon, 22d Nov. 1739, who became the hero of the day, and the sign of an alehouse in every village.



**Bays of Honduras and Campeachy.** You now come to the Bays of Honduras and Campeachy. In the Bay of Honduras we claim a right to cut logwood; which right the Spaniards dispute, whenever they want a pretence for quarrelling.



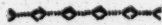
**River Mississippi.** Passing Vera Cruz, you leave the city of *Mexico* on the left, and continue coasting the Gulf of Mexico, till you come to New Orleans, near the mouth of the famous river Mississippi: the project of a trade to which, somewhat more than 50 years ago, ruined half the people in France.



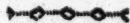
**III. India Islands.** Your next objects are the islands of

Cuba,  
St. Domingo, sometimes called  
Hispaniola.

These two belong to Spain.



**Havannah.** Near the western extremity of Cuba, you find the Havannah, which the late Lord Albemarle and Sir George Pocock took 13th Aug. 1762, in the war preceding the last.



**Jamaica.** South of Cuba lies our Jamaica; and to the northward, the Bahama islands.

East



East of St. Domingo, you fall in with another  
string of small islands; the chief of which are be-  
longing to the English :

Antigua,  
St. Kitts,  
Barbadoes, and  
Nevis.

Belonging to the French,  
Martinico,  
Guadalope,  
St. Lucia, and  
Dominica.

—•••••—

**Society Islands.** For the knowledge of the So-  
ciety Islands, in the Pacific Ocean, we are princi-  
pally indebted to the late Captain Cooke : they lie in  
between 15 and 20 degrees of S. latitude. In the  
center of these you observe the celebrated Otaheitee.

—•••••—  
To thee, O COOKE, familiar grew the task  
Of circling all our globe : Ocean rever'd  
Thy hardy enterprize ; reveal'd to thee  
New awful secrets of his mighty world.  
Philosophy  
Records with pride thy life-preserving arts :  
And oft by the ill-fated strand, where thou,  
O'erpower'd by barbarous multitudes, art fallen,  
The passing ship shall veil her gallant pomp,  
In homage to thy memory.

## Astronomical Dialogues.

Say, should the philosophic mind disdain  
That good, which makes each humbler bosom vain?  
Let school-taught pride dissemble all it can,  
These LITTLE THINGS are great to LITTLE MAN.

Goldsmith,

◀—○○○○—▶

PRECEPTOR. Astronomy, my boy, is the most sublime of all sciences, and the best for enlarging our minds, and filling them with the noblest ideas of the Great Creator and his works.

SCHOLAR. I have often heard, Sir, that the sun does not move; to what then is he fixed? and what hinders him from falling down to the earth, when he is so high above it; especially at noon in summer?

P. *High and low*, my dear, are only *relative terms*; for when the sun is at his lowest depression with respect to us, he is directly overhead to some other part of the earth; for the earth is round like a *globe*; and on whatever part of it's surface an un-  
taught

taught person stands upright, he thinks himself on the uppermost side, and wonders how any one can stand directly opposite to him, on the undermost side of the earth; or rather, how he can hang to it, with his head downward, and not fall off to the lower sky.

S. That is what I have often wondered at, when I have heard it affirmed that the earth is habitable on all sides; and that, where towns cannot be built, ships may sail. How comes it to pass, that the weight of a ship causeth it not to fall off from the lower seas; or that these ships and seas do not fall off to the lower sky altogether?

P. What we call *weight* is caused by *attraction*. The earth attracts all bodies on or near it's surface, towards it's centre, equally on all sides, every particle of matter alike; and therefore those bodies which contain the greatest number of particles of matter, acquire from this attraction the most forcible pressure, and consequently have (what we call) the greatest *weight*. The earth may be compared to a large round loadstone, rolled in filings of iron, which attracts equally on all sides; so that they cannot fall off even from it's undermost side: nay, it will take them up from a table, if they are within the sphere of it's attraction.

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S. So far, Sir, I understand you very well; but still it seems odd to me, that people should stand opposite to us on the earth, with their heads downward.

P. I believe it does; but you know, that either the sun must go round the earth to give us days and nights, or the earth must turn round like a globe on it's axis to do so; and will not either of these motions answer the intended purpose?

S. Undoubtedly.

P. Very well: then remember, that the sun does *not* move round the earth every twenty-four hours, but that the earth turns round in twenty-four hours: and, as the sun can enlighthten only one half of the earth at any given instant of time, the other half must then be in the dark. This motion of the earth will cause the different places on it's surface to revolve through the light and dark in twenty-four hours; in which time they must have a day and a night: and at the instant, when it is mid-day at one place, it must be mid-night at the opposite.

S. Pray, Sir, how do you *prove* that the earth turns round?

P. Stand.

P. Stand up for a minute. It is now seven o'clock in the morning, and you think you are standing upright, on the uppermost side of the earth. You will think the same, if you stand upright at seven o'clock in the evening, when the earth is turned half round, because you will then perceive no difference of posture: and yet, at that time, you will be very nearly in the same position as a person is just now, who stands on the side of the earth opposite to us: which person being as strongly attracted by the earth there, toward it's centre, as we are here, he is in no more danger of falling off downward, than we are at present of falling upward.

S. I beg your pardon, Sir; but pray is not *falling upward* an improper expression?

P. Yes; nor do I remember ever to have used it before. But, *up* and *down* are only *relative terms*. Let us be on what part of the earth we will, we call it *up* toward the sky over our heads; and *down* toward the center of the earth, to which all terrestrial bodies would fall by the power of the earth's attraction. So that, with regard to open space, what is *up* from any given point of the earth's surface, is *down* from the opposite point thereof. And as the sky surrounds the whole earth, we call it *up* toward the sky over our heads, be where we will;

will; and *down* from our place toward the centre of the earth.

S. Thank you, Sir; now it is very clear to me that we cannot perceive any difference, as to our position at different times of the day; but how can the earth move, and we not feel it's motion?

P. Were you ever in a ship at sea, in a calm day?

S. Many times.

P. And looked out of the cabin windows?

S. Very often.

P. And what did you see?

S. Several ships about us, and a distant town.

P. Did you see the same objects all the while?

S. The first object I saw, was a large house; but it seemed to me as if it moved very slowly toward the right-hand. I soon lost sight of it, and other objects appeared to my view, and disappeared slowly and gradually; which could arise from no other cause, than the very slow and gentle turning of the ship the contrary way.

P. True;



P. True; but did you feel the motion of the ship?

S. Not in the least.

P. And is not *that single case* sufficient to convince you, that the earth may turn round, and carry us all about with it, and we feel nothing of its motion; especially as the motion of the earth is much more regular and uniform than the motion of a ship.

S. But if the earth turns round, the parts of its surface must move very fast, to turn round once every twenty-four hours: and its motion must be eastward; because the sun, moon, and stars appear to move from East to West. But, pray Sir, how do you *prove* that the earth is *round like a globe*.

P. Thus: The sun shines through the window. Look at *this* small globe in my hand, and the flat circular plate that lies on the table. You see the globe may be hung by the thread which is fastened to it. I now twist the thread, and by it hang the globe in the beams of the sun; and the globe casts a shadow on *that* upright board behind it. You see the globe turns by the untwisting of the thread; but let it turn how it will, it always casts as round a shadow on the board as if it did not turn at all. I

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now fix a thread to the edge of the flat circular plate, and hang the plate by the thread a little twisted. You see, that when the broad side of the plate faces the sun, it casts a round shadow on the board, as the globe did: but as it turns obliquely toward the sun, by the untwisting of the thread, it's shadow is of an oval figure on the board; and when it's edge is turned toward the sun, it's shadow on the board is only a narrow straight line.

S. All this is plain, Sir; but I cannot imagine what you are to infer from it.

P. The earth always casts a shadow toward that part of the heaven, which is opposite to the sun; and the moon appears as flat to us as the board on which the shadow of the small globe was projected. When the earth's shadow falls upon the moon, we say, the *moon is eclipsed*. These eclipses happen at all different times of the twenty-four hours; and consequently, when all the different sides of the earth are successively turned toward the sun. But the earth's shadow on the moon is always bounded by a circular line; and therefore it is plain, that the earth must be of a globular shape. For, if it were shaped like *this* flat circular plate, it's shadow on the moon could never be circular but when it's broad side was turned directly towards the sun. At other times, the shadow would be either of an

L

oval

oval figure, or only a straight line, as you have seen on the board. There are several other ways of proving that the earth is round; but I believe you are satisfied that it is so, from what I have now shown you.

S. Yes, Sir, I am entirely satisfied; but I should be glad to know how you *prove* that the earth turns round; and that the sun does not go round the earth?

P. Before I proceed to the demonstration, let me ask you a question.

S. Twenty, if you please, Sir.

P. Suppose you put a small bird on a spit, and put it to the fire; whether is the better way, to turn the spit round with the bird, or to let the spit stand still, and move the fire round about it?

S. Your question makes me laugh, Sir. Who could be so absurd, as to set about contriving how to make the large fire and grate be carried round the spit?

P. Now I can assure you, that the sun is at least a million of times as big as our earth, and is therefore more unfit to be moved round the earth,  
than



than a great fire and the grate that holds it, are to be moved round a small bird on a spit.

S. Were I sure, that the sun could be proved to be a million of times as big as the earth, I should ask no other demonstration of the stability of the sun and the motion of the earth; because I should naturally conclude, that the sun is a million of times more unfit to move than the earth is. And, as the most superlative degree of wisdom and reason is in the Deity, 'tis impossible for me to imagine, he could do any thing that is irrational.

P. Very well, indeed. Now I will *prove* to you, that the earth turns round every twenty-four hours; not upon any real axis, but on an imaginary straight line within itself, passing through it's centre, and terminating in it's north and south points, which are called it's *north* and *south poles*; as an orange would turn round in the open air, if you first set it a-whirling, and then throw it off your hand.

Water naturally runs downward, all around the earth, from these parts which are highest, or furthest from the centre, toward those which are lowest or nearest to it; and this is caused by the power of the earth's central attraction, which draws the water and all other bodies that way. Now, if the earth was smooth, like a polished globe, all the parts of

it's surface would be equi-distant from it's centre, and water could never run upon it. About three-fourths of the earth's surface is covered by the seas which communicate with each other. And if the earth had no motion round it's axis, the attractive force (which is equal all around at equal distances from the centre) would cause the surface of the seas to be of a perfectly globular form.

S. Undoubtedly it would, Sir; for then, as every particle of the water's surface would be drawn with equal force toward the earth's centre, and these particles would touch each other, none of them could get nearer the centre than their neighbouring ones.

P. Right. Now, supposing the earth to be at rest, and the surface of the oceans and seas to be perfectly globular, what do you think the consequence would be, if the earth should begin, and continue to turn round on a line within itself, as if it turned on a real axis?

S. Let me think a little. I have observed, that when our maid took her mop out of a pail of water, the head of the mop was round: but when she began to trundle it on her arm, it immediately became flattened at the parts of the stick which were even with it's surface; and it swelled out in the middle.

Pray

Pray, Sir, if I may be allowed to make a very odd sort of a comparison, may not an imaginary line in the heart of that part of the stick which is within the mop, be called the axis round which the mop turns ; as you have told me that such a line within the earth, from it's north to it's south poles, is called the axis of the earth ? If so, seeing that the waters on the earth are of as yielding a nature as the cotton of the mop, I apprehend, that if the earth turned round it's axis, the surface of the seas about the poles would become flat, and the surface of the seas which are furthest from the poles would swell out all around : and, so the figure of the earth would be like that of a whirling mop.

P. No philosopher could have made amore apt comparison ; or have drawn a better conclusion from it. When I told you before, that the earth is round, I did not mean that it is strictly so ; although, at the distance of the moon, it would appear to be round, as it's shadow on the moon does to us. I do not here consider the hills as any thing, because they are so little in comparison to the whole bulk of the earth, that they take off no more from it's roundness in general, than grains of dust do from the roundness of *that* small three-inch globe which you see on the table. It is quite round, and covered all over with a map of the land and water on the earth's surface. Now, if the thin papers were



scraped off from the poles, and almost half way round them toward the equator, the globe would be a little flattened at the poles, and comparatively so much swelled out about the equator; but if it were then viewed from the distance of six or seven feet, it would still appear to be round.

S. I believe it would, Sir; but pray, what does all this mean?

P. From actual measurement and observation, the earth is proved to be a little flattened at the poles, and swelled out about the equator; the equatorial diameter of the earth being thirty five miles longer than the axis or polar diameter. This you may think a great deal, but it is very little when compared with the bulk of the earth which is 25000 English miles round. Now, as water naturally runs downward, if the earth had no motion on it's axis to keep up it's figure, the water of the seas would run from the higher parts about the equator, to the lower parts about the poles, and overflow the polar regions for many hundred miles all around; and even Britain itself would be laid several miles under water,

S. This is very plain, Sir: and the not returning of the waters from the seas about the equator, is to me an evident proof of the earth's turning round  
on

on it's axis; without which, the surface of the waters would become of a general roundness, as I saw the head of the mop do when the maid left off trundling it. And now it seems plain that the Almighty must have made the earth as much higher about the equator, as the land is about those places near the poles, because the earth's quick motion about the equatorial parts would cause the waters to rise there. For, I see by the globe, that there are great quantities of land about the equator, and many small islands in the seas, which are not overflowed.

P. The more you know of these matters, my dear, the greater reason you will have to admire the power, and adore the wisdom and goodness of the Deity.

S. Indeed, I believe I shall. But pray, Sir, inform me how many miles of the earth is land, and how many are covered by the seas.

P. The surface of the earthy part of our great globe is politically divided into four great spaces, named *Europe*, *Asia*, *Africa*, and *America*; as you see them laid out on the globe.

According to measurement of the best maps, the seas and unknown parts of land contain 160,522,026

L 4

square

square miles ; the inhabited parts 38,990,569 ;  
namely,

Europe,	4,456,065
Asia,	10,768,823
Africa,	9,654,807
America,	14,110,874

In all 199,512,595 square miles on the whole surface of our globe.

S. I admire the prodigious bulk of the earth ; but infinitely more so, the Power that must have put it in motion at first.

P. Nothing is great or small but in comparison. We are very big, when compared with animals which can be seen only by the help of a microscope : the earth is big indeed, when compared with ourselves who live upon it : the planet Jupiter is a thousand times as big as our earth, and the sun is a thousand times as big as Jupiter. If you so justly admire the Power that put our small planet, the earth, into motion ; how much more must you admire the Power which gave motion to the whole planetary system !





## Dialogue the Second.

S. WILL you have the goodness, Sir, to permit me now to repeat my query: *To what is the sun fixed?* For you have convinced me that he does not move round the earth.

P. The sun, my love, is not fixed to any thing; nor is it requisite he should. I told you, that the falling of bodies to the earth is solely caused by the earth's attraction.

S. I remember it very well, Sir; and their falling toward the earth's centre, on all sides of it, is a demonstrative proof of the earth's attraction. For what else could possibly determine bodies to fall, on opposite sides of the earth, in directions quite contrary to one another?

P. Right, my boy, you are a philosopher already: and I shall have great pleasure in teaching you, at least, the rudiments of astronomy.

The tendency of bodies to fall, is called their *gravitation*; and the power which gives them that tendency

tendency is called *attraction*. Now, supposing the sun to be the only body that exists in universal space; and that he is put into any part of open space; to what other part of space do you think he would fall?

S. I think he could not fall to any other part of space at all, because there would be no other body to attract him: and therefore, I imagine, he would always remain where he was placed, *self-balanced on his centre*.

P. Your observation is strictly just. And now, to lead you further on, I tell you, that the sun's attraction reaches many millions of miles all around him; and that all bodies attract each other according to their respective quantities of matter. I have already told you that the sun is a million of times as big as the earth: and as the sun and earth are within the reach of each other's attraction; whether do you think, that the sun should fall to the earth, or the earth to the sun?

S. I think, that if the sun contains as much more matter than the earth, as he is bigger than the earth, it is a million of times more reasonable, that the earth should fall to the sun, than that the sun should fall to the earth.

P. Right

P. Right again, my dear boy; but I must inform you, that the sun is not so dense a body as the earth; and therefore he does not contain as much more matter than the earth, as he is bigger than the earth. But his quantity of matter is more than 200,000 times as great as the earth: and, consequently, he attracts the earth more than 200,000 times as strongly as the earth attracts him.

S. Then I should think, that the sun and the earth would naturally fall toward each other, and come together at last: only that the earth would fall 200,000 times as fast toward the sun, as the sun would toward the earth.

P. And so they would, if there were nothing to hinder them.

S. Pray, Sir, what hinders them?

P. I will begin to answer your question by asking one. Did you ever put a pebble into a sling, and whirl it round your head?

S. Yes, Sir, this morning.

P. And did you feel no tendency in the pebble to fly off from the sling?

S. O yes! and the moment I let the string slip from my hand, away flew the pebble. I likewise remember,



remember, that the faster I whirled the fling, the greater was the tendency of the pebble to fly off; and that I was obliged to pull the string so much the stronger to keep the pebble from flying off.

P. That observation will be of more service to you by and by, than you at present think of: it will be too soon to tell you just now how it will.

S. I am almost impatient, Sir, to know what you are to infer from the pebble and fling.

P. All bodies that move in circles have a constant tendency to fly off from these circles; which tendency is called their *centrifugal force*. And, in order to keep them from flying off, there must be an *attractive force* at the centers of these circles, equal to the centrifugal force of the moving bodies. The earth goes round the sun once a year, in an orbit nearly circular: and it would as naturally fly off from it's orbit, if the sun did not attract it, as the pebble flew out of the orbit, that is described round your head, when you quitted your hold of the string.

S. This is quite new to me, Sir; for you never told me before that the earth goes round the sun. The earth then has two motions; one round it's axis in twenty-four hours, and one round the sun  
in

in a year. Can you prove as clearly, Sir, that the earth goes round the sun, as you have proved that it turns round it's own axis?

P. Observe, my boy, if the earth had no motion round the sun, it could have no centrifugal force, to hinder it from falling into the sun by it's own weight, which is caused by the sun's attraction.

S. I see that the earth's motion round the sun is indispensably necessary, and am therefore satisfied that it does exist. But I think the sun would require some motion too, in order to give him a centrifugal force; without which, it seems to me, that, big as he is, the earth's attraction would pull him out of his place; for I remember, that the pebble and sling pulled my hand so strongly, although the pebble was small, that I could not possibly keep my hand steady, whilst the pebble was in motion.

P. Well done. The sun really moves in an orbit as well as the earth; and the sun's orbit is as much less than the earth's, as his quantity of matter is greater than the earth's. And, as both these bodies go round their orbits in the same period of time, the sun moves as much slower than the earth, as his quantity of matter is greater than the earth's. So, what the sun's motion wants in swiftness, is made up by his quantity of matter; and what the  
earth

earth wants in quantity of matter, is made up by the swiftness of it's motion in it's orbit: on which account, their centrifugal forces are equal to each other's attractions; and as these attractions keep them from flying out of their orbits by their centrifugal forces, so these forces keep them from falling towards each other, by their mutual attractions. And this is what we call, *the GREAT balance of nature.*

S. This is new light to me; and delightful it is. But, although I think I understand it, Sir, I yet wish you would further explain it.

P. Certainly. You see here are two balls of different quantities of matter, and consequently of different weights; and you observe that these balls are connected by a wire, which you must suppose to have no weight, like the immaterial line, in which the sun and earth attract each other. Hang the wire by a thread fixed to a point, as much nearer the centre of the great ball, as the weight of the little ball is less than the weight of the great ball; and then, these balls will support and balance each other. The point where the thread is fixed, may represent the center of a steel-yard, which bears the weights that are at both it's ends. And as gravity and weight are synonymous terms, the point where the thread is fixed, is not improperly termed the *center of gravity* of the two balls.

S. I under-



S. I understand you perfectly well, Sir; and am much obliged to you for the pains you have taken to make every thing so plain to me.

P. And now, if you twist the thread by which the wire and balls are suspended, the untwisting of the thread will cause them both to go round; the great ball in a small circle, and the little ball in a large circle; and the center of gravity between them will remain at rest.

S. From which I infer that the center of gravity is a motionless point.

P. Your inference is right.

S. I was just going to ask a question, but am very glad a lucky thought prevented me.

P. Never fear, but speak out, right or wrong: if you are wrong, I will not laugh at you; I will put you right. Pray what was your intended question?

S. As we are obliged to hang the wire and balls by a thread, to support their center of gravity; I was just about to ask what is it that supports the center of gravity between the earth and sun?

P. Well: and what was the lucky thought that prevented your asking that question?

S. I imme-

S. I immediately recollected, that we must support the center of gravity between the two balls; because, otherwise, they would have fallen to the great earth by the power of it's attraction. But, as there is no greater body than the sun and earth to attract them, they could fall no way but toward each other: and therefore, the common center of gravity between them needs nothing to support it.

P. If you had asked the question, I should have told you the very same thing.

S. You have already told me, Sir, that the earth is a planet; and that there are other planets besides, which go round the sun.

P. Yes; there are six besides our earth: named, *Mercury, Venus, Mars, Jupiter, Saturn, and Georgium Sidus.*

S. Then our sun must be their sun too.

P. It is really so; and enlightens them all.

S. I could never believe that the Almighty does any thing in vain; and therefore I begin to think, that all the other planets are inhabited as well as our earth. For, to what purpose could the sun shine upon lifeless lumps of matter, if there were no rational creatures upon them, to enjoy the benefit of his light and heat.

P. Ay,

P. Ay! Why indeed? And I will tell you one thing more, which will confirm your belief that they are inhabited. They turn round their axes, as our earth turns round it's axis; for which plain reason, they have days and nights as our earth has: and those which are furthest from the sun, and which, consequently, have much less light than our earth has, have moons to enlighten them: *Jupiter* has four moons; *Saturn* has seven\*; and *Georgium Sidus*, two.

S. To me this is a proof of their being inhabited; but pray, Sir, do all the planets go round the sun in a year, as our earth does?

P. No: those nearest the sun go soonest round him.

S. Do they all move round the center of gravity, between the sun and themselves, as round a fixed point.

P. They do.

S. Then, as the times of their going round the sun are so various, I cannot see how the sun can describe any regular circle round the common center of gravity between him and them all. For, in

\* Of these, the two nearest to Saturn were lately discovered by Dr. Herschel.



order that the sun should move regularly round such a circle, I think all the planets would need to be joined in one mass.

P. 'Tis very true, my clever fellow ; and we must proceed by degrees. What I showed you was only on supposition, that there is but one planet belonging to the sun. But as there are seven belonging to him, and going round him in very different periods of time, he is only agitated (as it were) round the common center of gravity of the whole system ; and describes no regular circle round it ; but is sometimes nearer to it, and at other times further from it, according as he is attracted by a greater or smaller number of planets toward any side of the heavens.

S. In what time, Sir, do all the planets go round the sun ?

P. <i>Mercury</i>	goes round in about	3 months.
<i>Venus</i>	- - -	$7\frac{1}{2}$ months.
<i>The Earth</i>	- - -	365 $\frac{1}{4}$ days.
<i>Mars</i>	- - -	2 years.
<i>Jupiter</i>	- - -	12 years.
<i>Saturn</i>	- - -	30 years.
<i>Georgium Sidus</i>		83 years.

They all move round the sun the same way ; from West, by the South, to East.

S. And

S. And do you know their distances from the sun?

	Billions of Miles.
The mean distance of <i>Mercury</i> is - -	37
That of <i>Venus</i> - -	69
The <i>Earth</i> -	96
<i>Mars</i> - -	146
<i>Jupiter</i> - -	500
<i>Saturn</i> -	916
<i>Georgium Sidus</i>	1832

S. The distances are so immensely great, that I can form no ideas of them.

P. Great as you may think them (and to be sure great they are), yet some of the comets go almost seven times as far from the sun as the *Georgium Sidus* is. For if any comet should go as near to any star as it is to the sun, when furthest from him, it would be as much attracted by that star as it is then by the sun; and it's motion being then toward the star, it would go on, and become a comet to that star; and we should never hear of it any more. And now, my boy, what do you think of the distance of the stars?

S. I am lost in wonder! But, Sir, supposing there were no comets, pray is there any other way by which we might know, that the distance of the stars is so inconceivably great?

M 2

P. The

P. The earth goes round the sun every year, in an orbit, which is 192 millions of miles in diameter. Therefore we are 192 millions of miles nearer to some of the stars just now, than we were half a year ago, or shall be half a year hence: and yet, for all that, the same stars still appear to us of the same magnitude, and at the same distance from each other; not only to the bare eye, but also when viewed by the nicest made instruments; which shows very plainly, that the whole diameter of the earth's orbit—that 192 millions of miles, are but a point in comparison to the distance of the stars.

S. All further proofs of the almost infinite distance of the stars would be superfluous. But you were speaking of comets just now, Sir; pray, are they not dangerous? We are always frightened when we hear of their appearing, lest their fiery trains should burn the world.

P. That is owing to not knowing better. The orbits of the planets are nearly all in the same plane (as if they were circles drawn on a flat board), but the orbits of the comets are elliptical, and all of them so oblique to the orbits of the planets, and also to each other, that no comet can ever touch a planet. And, as to the appearances, called the tails of the comets, they are only thin vapours arising from the comets, which could not hurt any planet, if it  
should



should happen to go through that vapour, when the comet is crossing the plane in which the planet's orbit lies. If these trains were fire, we could not see any thing through them that is beyond them. For, if you hold a candle between you and any object, you cannot see that object through the flame of the candle; but the smallest stars are seen through the tail of a comet.

S. Thank you, Sir; this is comfortable doctrine. Considering how far the planets are from the sun; and in what times they go round him, they must move very fast in their orbits. I should be glad to know how many miles they move every hour.

Miles, per hour.

P.	<i>Mercury</i> moves in his orbit,	about	110,000
	<i>Venus</i>	- - -	80,000
	<i>The Earth</i>	- - -	68,000
	<i>Mars</i>	- - -	55,000
f	<i>Jupiter</i>	- - -	30,000
	<i>Saturn</i>	- - -	22,000
	<i>Georgium Sidus</i>	-	15,107

S. And we are carried 68,000 miles every hour, along with the earth, in open space, without being in the least sensible of that rapid motion.

P. We are indeed, my love.

S. Pray, Sir, what are the magnitudes of the sun and planets?

P. The sun's diameter is 890,000 miles; and his magnitude is nearly  $1\frac{1}{2}$  million times larger than the earth, and about 500 times larger than all the planets together. But the magnitudes of the planets, when compared with the sun, may be better comprehended, by supposing the sun to be two feet in diameter: thus, if

The Sun be - 2 feet, in diam.

Mercury will then be  $\frac{1}{15}$  of an inch.

Venus - -  $\frac{1}{7}$

The Earth - -  $\frac{1}{5}$

Mars - -  $\frac{1}{12}$

Jupiter - -  $2\frac{3}{4}$  inches.

Saturn - -  $2\frac{1}{10}$  inches, and

Georgium Sidus 1 inch.

The moon's mean distance from the earth's centre is 240,000 English miles; her diameter is 2170 miles; she moves (with respect to the earth) 2290 miles in her orbit every hour; and she goes round the earth from change to change, in about  $29\frac{1}{2}$  days.



I will now write you a table of the moons, of *Jupiter*, *Saturn*, and *Georgium Sidus*.

	Dists from the Primaries.	Periods.			
		d.	h.	m.	sec.
First moon of <i>Jupiter</i>	266333	1	18	28	36
Second - - - -	423000	3	13	18	50
Third - - - -	673666	7	3	59	40
Fourth - - - -	1190666	16	18	5	6
<hr/>					
First moon of <i>Saturn</i>	not deter.	not deter.			
Second - - - -	not deter.	not deter.			
Third - - - -	346125	1	21	18	30
Fourth - - - -	338750	2	17	41	30
Fifth - - - -	585006	4	12	25	12
Sixth - - - -	1404000	15	22	41	15
Seventh - - - -	4212000	79	7	48	0
<hr/>					
First moon of <i>Geor- gium Sidus</i> - -	289650	8	17	1	19
Second - - - -	388395	13	11	5	1

None of these thirteen *secondary* planets can be seen by the inhabitants of the earth without telescopes.

S. Pray, Sir, what can you tell me of *Saturn's Ring*?



P. *Saturn* is encompassed by a broad thin *ring*, set edge-ways round it, and the distance of the ring from the planet, is 20,000 miles, equal to the breadth of the ring. The sun shines for almost fifteen of our years together on the northern side of the ring, then goes off, and shines as long on the southern side of it: so that there is but one day and one night on each side of the ring, in the time of *Saturn*'s whole revolution, which takes, you know, almost thirty of our years. *Saturn*'s seven moons move round him on the outside of the ring, which Dr. *Herschel* has found to be double.

S. You told me, Sir, that the other planets turn round their axes, as our earth does: pray do they all turn round eastward, so as to cause the sun and stars to appear to go round westward; and in what times do they turn round?

P. By viewing them with good telescopes, we see spots upon most of them, which adhere to their surfaces, and appear and disappear regularly on their opposite sides. By the motion of these spots which are all eastward, we know that *Venus* turns round her axis in 23 hours, 20 minutes. *Mars* turns round in 24 hours, 40 minutes, of our time; and *Jupiter* in 9 hours, 56 minutes; and Dr. *Herschel* has lately discovered, that *Saturn* revolves round his axis in about  $10\frac{1}{4}$  hours. The time that

*Georgium*

*Georgium Sidus* turns on his axis is not yet known. The *Sun* also turns round his axis in 25 days, 6 hours, from West to East.

S. Why should the sun turn round? for, as he is the fountain of light, he can have no days and nights.

P. To turn away his dark spots from long facing the planets, and thereby to dispense his light the more equally all around him to the planets. This has been a long conversation, but I wish to inform you, that the ancient poets named

*Mercury*, the messenger of the gods, on account of his rapid movement.

*Venus*, the goddess of beauty, from her being the most beautiful star in the heavens.

*Mars* was named the god of war, from his sanguinary appearance.

*Jupiter*, the god of thunder.

*Saturn*, the god of time.

S. Sir, I wish you a good morning, and gratefully thank you.

~\*~\*~\*~\*~\*~

## Dialogue the Third.

~\*~

S. I REMEMBER, Sir, you told me that Mercury moves in his orbit 110,000 miles every hour; and Saturn only about 28000. I observed also, that the further the planets are from the sun, they not only take longer times to go round him, but also move slower in every part of their respective orbits. Pray, what *reason* can you assign for this?

P. The nearer that any planet is to the sun, the more strongly it is attracted by the sun; therefore, those planets which are the nearer to the sun, must move the faster in their orbits, in order thereby to acquire centrifugal forces, equal to the power of the sun's attraction; and those which are the further from the sun must move the slower, in order that they may not have too great a degree of centrifugal force, for the weaker attraction of the sun at those distances.

S. Then I understand, that the sun's attraction, at each particular planet, is equal to the centrifugal force of each planet; and, by that mean, the planets are all retained in their respective orbits.

P. It is accurately so.

S. Then,



S. Then, as the *power* of the Deity is manifest, in having set off such large bodies as are the planets, with such amazing degrees of velocity; so his *wisdom* is conspicuous, in having so exactly adjusted their velocities, and consequently, their centrifugal forces, to the different degrees of the sun's attraction at the distances the planets are from him. Here is a wonderful *balance* indeed! Pray, Sir, does the power of the sun's attraction decrease in proportion as the distance from him increases?

P. No, my dear; his attractive force diminishes in proportion as the squares of the distances from him increase. So that, at twice the distance from the sun's centre, his attractive force is 4 times less; at thrice the distance, it is 9 times less; at four times the distance, the attraction is 16 times less; and so on. And this we find from the comparative distances of the planets from the sun, and their different velocities in their orbits.

S. I should be glad to know the *reason* why the sun's attraction decreases, in proportion to the squares of the distances from him.

P. My dear, you ask me a question which SIR ISAAC NEWTON could not solve; although he was the prince of philosophers.

S. But,

S. But, pray Sir, can you give me no idea at all of it?

P. I could; and a very plain one too: if the attractive force (the effect of which we call gravity) acted only according to the *surface* of the attracted body.

S. If gravity acts not according to the quantity of surface, pray, how does it act?

P. Exactly in proportion to the *solid contents* of bodies; for were you to weigh a plate of metal, and then divide it into any number of equal parts; if you lay these parts above one another in the scale, they will be just as heavy as they were, before divided.

S. Then it seems, Sir, that there is no way of accounting for the manner, in which gravity acts, only by resolving it into the will of the Deity.

P. Indeed there is not. And, therefore, when I henceforth speak of gravity, I would have you always understand, that I do not thereby mean a *cause*, but the *effect* of a *cause*, which we do not comprehend. Now, my love, I will inform you, that the light of the sun, or of any other luminous body, decreases in proportion as the square of the distance, from the luminous body, increases. The  
rays

rays of the sun's light go out in straight lines from all points of the sun's surface: and, consequently, the further they go off from the sun, the more they spread.

S. Pray, Sir, how is it known that light moves in straight lines?

P. Because we cannot see a lighted candle through the bore of a bended pipe; but we can through a straight pipe.

S. As the comparative distances of all the planets from the sun are known, I make no doubt but you can tell me what are the comparative quantities of the sun's light and heat on all the planets.

P. Very easily. The sun's light and heat is 7 times as great on *Mercury* as on the earth; about twice as great as *Venus*; at *Mars* not  $\frac{1}{2}$  so strong as on the earth; *Jupiter* receives only  $\frac{1}{27}$  part of the light and heat that the earth does; *Saturn* about  $\frac{1}{96}$  part; and *Georgium Sidus*  $\frac{1}{376}$ .

S. It seems to me, Sir, that the inhabitants of the nearest planets to the sun must be blinded by too much light; and that those of the furthest planets live almost in darkness.

✓ P. Your



P. Your reflection is very natural; but I must ask you a question or two.

S. Pray do, Sir.

P. After you have been a while out in the snowy street, can you see as well to read, immediately on coming into your room, as you did before you went out?

S. No, Sir.

P. Can you bear the strong reflection of the sun's light from the snow, just as well, when you go into the street, as when you have been walking half an hour in it?

S. No, Sir.

P. Can you give such a satisfactory reason for this as would satisfy a philosopher? For you know that the snow reflects not less light for your having been a while walking in it; nor is your room the darker for your not having been out of it.

S. Indeed I cannot answer these questions.

P. Then I will tell you. Our eyes are made so, that their pupils dilate, when the light is weak, that they may take in more of it; and contract, when the light is strong, that they may admit the  
fewer

fewer of it's rays. Whilst you are in a room, the pupils of your eyes are dilated; and for that reason, when you go out, they take in too much of the light reflected from the snow, which you find is painful. But they soon contract, so as to admit no more of that strong light than you can easily bear. And then, when you come into your room, with the pupils of your eyes contracted, the room being not so light as the street, appears darker to you than it did before you went out: but, in a short time, the pupils dilate again; and then they let in a sufficient quantity of light, by which you can read.

Now, supposing all the other planets to be inhabited by such beings as we are; if the pupils of their eyes, who live on the planet Mercury, are seven times as small as ours, the light will appear no stronger to them there, than it does to us here.

And if the pupils of their eyes who live on Saturn, are 90 times as large as ours, the light there will be of the same strength as it is to our eyes here. How many full moons, my boy, do you think there would need to be placed in a clear sky, to afford us moon-light, equal to common day-light, when the sun does not shine out?

S. Perhaps sixty; or an hundred, at most. For when the full moon is not clouded, she shines so clearly,

clearly, that I can read a small printed book by her light.

P. Indeed you are greatly mistaken: for it would require 90 thousand; and *that* number would fill the whole of our visible sky.

S. You amaze me, Sir! but pray, how can you find any method of comparing moon-light with day-light, so as to ascertain the great difference between the quantities thereof?

P. Have you never observed the moon pretty high in the morning, after the sun was risen, when the moon was about three quarters old?

S. Yes, Sir: and when I have seen her, as it were, among whitish clouds, she appeared much of the same colour as they did; very dim, in comparison with what she appears in the night.

P. And yet, she was just as bright then as she is in the night; only the superior light of the day made her seem so much otherwise. Like a candle, which appears very bright in the night; but place it in the street in day-light, and it will seem very dim, although it's real brightness is still the same.

S. Pray, Sir, proceed.

P. When the sun is hidden by clouds, all the light we have is by reflection from them. The  
moon



moon reflects the sun's light in the night, as the clouds do in the day : and as she can reflect no more light in the day than a small whitish cloud does, that covers as much of the sky as the moon covers ; she can reflect no more in the night. And as the full moon fills only a 90 thousandth part of the sky, her light is no more than equal to a 90 thousandth part of common day-light. Now, as the light of the sun at Saturn is equal to a ninetieth part of his light at the earth, and common day-light at the earth is 90,000 times as great as moon-light ; divide 90,000 times by 90, and the quotient will be 1000 ; which shows, that the sun's light at Saturn is 1000 times as great as the light of the full moon is to us.

S. I see plainly that it must be so : but pray, Sir, did not you mention the light's *going* from one place to another, as if it took some time in moving through open space. I know that sound does so ; because I have seen the flash of a distant cannon before I heard the noise that it made.

P. True, my love ; but you did not see the flash at the *instant* it was given, though you saw it *very* soon after.

S. Pray, Sir, do you know with what degree of swiftness light moves ?

N

P. Yes ;

P. Yes; and you shall soon know too. The earth's orbit lies far within the orbit of Jupiter.

S. Undoubtedly; because Jupiter is much further from the sun than the earth is.

P. Then you know, that when the earth is between Jupiter and the sun, the sun and Jupiter appear opposite to each other in the heavens. And when the sun is nearly between us and Jupiter, the sun and Jupiter appear nearly in the same part of the heavens.

S. Certainly, Sir.

P. Therefore, when the sun and Jupiter appear almost close together, the earth is almost the whole diameter of it's orbit further from Jupiter, than when it and Jupiter appear opposite to each other in the heavens.

S. Yes, Sir.

P. The times when Jupiter's moons must be eclipsed in his shadow are easily calculated; because by telescopic observations, the times in which they go round him are accurately known; and the apparent vanishing of these moons in the shadow may be very well perceived through a telescope; or the instants when they recover their light again, by the  
sun's

sun's shining upon them, at their going out of the shadow. And it has been always observed, since telescopes were invented, that these eclipses are seen sixteen minutes sooner when the earth is nearest to Jupiter, than when it is furthest from him: which shows, that light takes sixteen minutes to move through a space equal to the diameter of the earth's orbit, which is 192 millions of miles. And, consequently, it must take eight minutes in coming from the sun to us.

S. I understand this, Sir; but——

P. But what?

S. The rays of the sun's light come directly from him to the earth; but his rays from Jupiter's moons come to us only by reflection. Now, Sir, is it known that reflected light moves with the same velocity that direct light does?

P. There is no reason to believe but that it does. For, if the particles of light did not fly off from the planets as fast as they came upon them, there would still be an accumulation of light upon them; which would make them appear every night *brighter* and *brighter*; but, in reality they do not. And if the light flew off faster from the planets than it comes



upon them, they would appear *dimmer* and *dimmer* every night, which is not the case.

S. But pray Sir, are *all* the rays which the sun darts on any planet *reflected* from it, and none of them absorbed in the matter of which the planet is composed? Or, if *some* of them be absorbed, will not this invalidate your argument?

P. Not at all, if the absorbed rays bear a constant proportion to the *whole* number of rays by which the planet is successively illuminated; and this must undoubtedly be the case; for some parts of the planet's surface which either reflect or absorb the rays that fall upon them *this* moment, will be equally disposed to reflect or absorb the rays that fall upon them in the *next*; and so the *same proportion* between the absorbed and reflected rays, or between them and the whole quantity of light thrown on the planet, will be continually preserved.

S. But if some parts of the planet's surface be more hardened by drought, or softened by wet, as on our earth; or be in any other respect more disposed, either to reflect, or absorb the sun's rays at some times than at others; would not this vary the proportion you have mentioned?

P. If

P. If we may judge of this from our own globe, where the contrary qualities of drought and wet, hardness and softness, smoothness and roughness of some parts of it's surface, so far as they result from any alterations of the *weather*, &c. if taken upon an average for a whole year, or other given time, and throughout any half of the earth's surface; they will, very nearly, if not exactly, balance each other. The same may be therefore supposed to hold good in the other planetary worlds; and so the proportion before mentioned will not be sensibly altered.

S. You have quite removed my difficulties, Sir. But, as light comes from the sun to the earth in eight minutes, it must move very swiftly. Let me see *how* swiftly. The sun's distance from the earth is 96 millions of miles; and light moves through that space in eight minutes of time: I therefore divide 96,000,000 by 8, and the quotient is 12,000,000 the number of miles that light moves in a minute. Now, Sir, I remember that you told me, a cannon-ball moves at the rate of 480 miles in an hour, which is eight miles in one minute; I therefore divide 12,000,000 by 8 and the quotient is 1,500,000: so that light moves a million and half of times as swift as a cannon-ball. Amazing indeed!

P. It is so: and full as amazing is the *inconceivable smallness* of the particles of light.

N 3

S. Pray,

S. Pray, Sir, how is it known that they are so inconceivably small.

P. Thus, my dear. The force with which a body strikes any obstacle, is directly in proportion to the quantity of matter in the body, multiplied by the velocity with which it moves. And, consequently, as the velocity of light is a million and half of times as great as the velocity of a cannon ball, if one million and half of the particles of light were but as big as a common grain of sand, we could no more keep our eyes open to bear the impulse of light, than we could to have sand shot point blank against them from a cannon.

Again. Let a lighted candle be set on the top of a steeple's spire, in the night, and there will be a very large spherical space filled with the light of the candle before a grain of the tallow be consumed; and as *that* grain of tallow is divided into so many particles, as to fill all the space into which the light is diffused, can you possibly imagine how small the particles are into which it is so divided?

S. Indeed, Sir, I can form no idea thereof.

P. A very good computist has found, that the particles of blood of those animals which can only be seen by means of a microscope, are as much smaller



smaller than a globe, whose diameter is a tenth part of an inch, as that small globe is less than the whole earth. And yet their particles are like mountains to a grain of sand, when compared with the particles of light.



## Dialogue the Fourth.



S. IF the moon were big enough to be seen by an observer placed on the sun's surface, pray, Sir, would not she always appear to that observer as a full moon does to us.

P. Yes, my dear, she certainly would; because, whichever side of her is turned toward the sun at any time, *that* side would be fully enlightened by the sun.

S. And I imagine, that if an observer were placed on the side of the moon which always keeps toward the earth, the earth would appear to him in all the different forms that the moon does to us. Only, that when the moon is *new* to us, the earth

would be *full* to the moon; and when the moon is *full* to us, the earth would disappear, or be *new* to the moon.

P. What reason have you for thinking so, my boy?

S. Because whichever side of the earth or moon is turned toward the sun at any time, that side is then enlightened by the sun. And therefore, when the dark side of the moon is toward the earth, the enlightened side of the earth is then fully toward the moon; and must appear to her like a large full moon. And when the enlightened side of the moon is fully toward the earth, the dark side of the earth is toward the moon, and therefore it cannot appear to the moon. Also when the moon appears half full to us (or in her first quarter) the earth must appear half decreased to the moon, being then half-way between it's full and change, as seen from her. And when the moon is in her third quarter as seen from the earth, the earth must appear in it's first quarter to the moon, it being then the middle time between the new and full earth, as seen from the moon.

P. You are exactly right, my dear; and as the surface of the earth is 13 times as large as the moon's

moon's surface, when the earth is full to the moon, it's surface appears 13 times as big to the moon, as the surface of the full moon does to us.

S. The moon, Sir, goes round the earth every month; and as the earth goes round the sun in a year, the moon must do so too. Pray how happens it, that the earth, by moving at the rate of 68,000 miles every hour, in it's orbit, does not go off, and leave the moon behind?

P. The moon is within the sphere of the earth's attraction; and, therefore, let the earth move in it's orbit as fast as it will, the moon must accompany it. For you know, that if you put a pebble into a sling, and whirl it round your head, the pebble will go round and round your head, whether you stand still in the same place, walk forward, or go round the circumference of a large circle. And the tendency of the pebble to fly off, and the force with which you hold the string to confine the pebble in it's orbit, will be the same in one case as in the other.

S. I thank you, Sir, for having set me right; and at the same time for convincing me by the simile, that the moon's centrifugal force is equal to the power by which the earth attracts her, and thereby  
retains




retains her in her orbit; for, if her centrifugal force were greater than the earth's attraction, she would fly out of her orbit, and so abandon the earth: and if her centrifugal force were less than the power by which the earth attracts her, she would come nearer and nearer the earth in every revolution, and would fall upon it at last.

P. I find, my dear boy, that you very seldom need to be set right; and when I do, you always improve upon it, by making further observations.

S. You are very kind to encourage me, Sir. But it seems that the moon goes just round her orbit between change and change; and yet, I think, that as both the earth and moon go round the sun in a year, the moon must not only go round her orbit between change and change, but even advance as many more degrees as the earth has moved in it's orbit during that time, in order to be again in conjunction with the sun. For, in whatever part of the dial-plate of my watch, I find the hour and minute-hands in conjunction, I observe that the minute-hand must go as much more than round to the same point again, before it overtakes the hour-hand, as the hour-hand advances in the interval between it's last conjunction with the minute-hand and it's next.

P. You

P. You are right, my love, and your inference from the hour and minute-hands of the watch are full as good as mine from the pebble and fling.

S. Pray, Sir, in what time does the moon go round her orbit from change to change 

P. In twenty-nine days, twelve hours, forty-four minutes and three seconds.

S. And what is her distance from the earth's centre?

P. Two hundred and forty thousand English miles.

S. How many times, Sir, would it take round the earth, to go round the moon's orbit?

P. Sixty times: and therefore, every degree of the moon's orbit is equal in length to sixty degrees of a great circle on the earth's surface.

S. Pray what is the moon's diameter?

P. About 2180 miles.

S. What are those spots which we see on the moon? I think I have heard that they are seas.

P. So

P. So they were thought to be, before there were good telescopes to view the moon by. But now they are found to be only darker places of the land in the moon, which do not reflect the sun's light so copiously as the whiter parts. For we see that they are full of pits and deep vallies: but if they were seas, they would have even and smooth surfaces.

S. Certainly, Sir. But it may be known by these spots whether the moon turns round her axis; if she does, I should be glad to know in what time; because I should thereby know the length of her days and nights.

P. She turns round her axis exactly in the time she goes round her orbit; and that we know by her keeping always the same side toward the earth.

S. Then, Sir, she can have only one day and one night between change and change, or in 29 days, 12 hours, 44 minutes, 3 seconds, of our time.

P. Exactly so.

S. You say, Sir, that the time from change to change is 29 days, 12 hours, 44 minutes, 3 seconds: pray in what time does the moon go round her orbit?

P. In



P. In 27 days, 7 hours, 43 minutes, 5 seconds.

S. And how far does the earth move in it's orbit between change and change of the moon?

P. Twenty nine degrees, 6 minutes, 25 seconds.

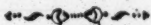
S. Then 'tis plain that the moon goes 29 degrees, 6 minutes, 25 seconds, more than round her orbit.

P. True, my dear; and now observe, that the moon's *going round her orbit* is named, her PERIODICAL REVOLUTION; and her *going round from change to change*, is named her SYNODICAL REVOLUTION.

S. Sir, I thank you most sincerely.



## The Earth a Globe.



MY love, the elements observe their bounds;  
 But earth and water in one body join,  
 Within one frame of mutual union orb'd:  
 Yet separate and free; both bent alike  
 By *gravitation* to a spheric form,  
 Which all, that to a centre tends, affects.  
 Yes, reason teaches *earth* to be a *globe*;  
 But, if the sense appear a safer guide,  
 Signs are not wanting to evince the truth:  
 For, if the face of earth were wholly plain,  
 The sun not sooner would salute the east,  
 Than Cadiz would be brighten'd by his ray:  
 And, at his setting, night would shroud at once,  
 With her black wings, all nations of the globe,  
 On the broad surface of that mighty plane.  
 Now, by degrees, Aurora breaks the shades;  
 And, when the golden lamp wakes from his couch  
 The soft inhabitant of Ind, night's dew  
 Rises in west; when she involves in gloom  
 The Indian regions, splendid radiance spreads  
 On the fair brow of the Hesperian land;  
 Slower to these, and earlier to those,  
 Since earth, with curve insensible, ascends,  
Presenting

Presenting the successive beams of day :  
 Nor less th' eclipses of the moon will prove ;  
 When to her brother's rays oppos'd, she veils  
 Her countenance in melancholy dusk ;  
 For when with us in early night obscur'd,  
 At midnight Persia views her darkened orb.

Why if the earth were plane, when the eclipse  
 Is partial, is the line of darkness curv'd ?  
 For still the shadow gives intelligence  
 Of that from whence it flows ; triangular,  
 When from a triangle it comes ; and square,  
 Or an oblong rectangle, when it strikes  
 Projected from a square : the globular  
 Casts a round shadow ever ; but the plane,  
 If circular, oft strikes into ellipse.  
 Therefore, since still the shadow, which is cast  
 From the earth's body on the moon, is round,  
 Conclude the earth a globe ; and see the truth.

And hence too, that the earth's declivity  
 On either side presents a sphere, we learn ;  
 For, as we journey further to the south,  
 The Cynosure sinks nearer the North Pole,  
 If northward more, then the resplendent Wain  
 Rises : and thus the correspondent heav'n  
 Answers our progress on the convex earth.

Nor



Nor let it move thee, that some parts rise high  
 In mountains ; others sink into deep vales :  
 Each way conformable to human use.  
 These inequalities to us seem great ;  
 But to an eye that comprehends the whole,  
 The tumour, which to us so monstrous seems,  
 Is as a grain of sparkling sand that clings  
 To the smooth surface of a sphere of glass ;  
 Or as a fly upon the convex dome  
 Of a sublime, stupendous edifice.

Nor less the wave to the same form aspires,  
 Press'd by it's weight and gravitating force:  
 For as on land, so in the vast of sea  
 The pole now rises, and now sinks, depress'd ;  
 While ocean swells a portion of our sphere.

Behold, when the glad ship shoots from the port  
 Upon full sail, the hulk first disappears,  
 And then the lower, then the higher sails ;  
 At length the summit of the tow'ring mast  
 Alone is seen : nor less, when from the ship  
 The longing sailors eye in hope the shore :  
 For then, from the top-mast, though more remote  
 Than either deck, the shore is first beheld.

Nay, in the smallest drop this truth is seen ;  
 Which, still consenting with the greater mass,  
 Assumes the honours of a spheric form,

And

And constantly it's rights, as water, keeps.  
 Nor more the properties of fluid claims  
 Th' immense of ocean, than the dew which rests  
 In liquid pearl upon the summer's blade ;  
 And as this dew coils in a silver orb,  
 And as the drop dependent from each roof,  
 When the autumnal heaven descends in rain,  
 The same just figure constantly effects :  
 So the diffusive fluid of the sea  
 Swells convex, and preserves an equal form.

*That very law\* which moulds a tear,  
 And bids it trickle from it's source :  
 That law preserves the earth a sphere ;  
 And guides the planets in their course.*

Geography triumphant reigns ; and shows  
 The earth, and sea, and air one perfect orb,  
 Self-balanc'd in the viewless realm of space.



### The Earth has Motion.



THE earth but rarely feels a sudden shock :  
 And seemingly in total rest abides :  
 Yet, constant in her motion ; regular,

\* The law of gravitation.

O

and

And

And equable, and beautifully just :  
 Daily her axe revolving ; in her orb  
 Elliptical, completing still the year :  
 Yet, what opposes our hypothesis,  
 Let us a while attend. The gravity  
 Of this terrestrial mass is urg'd in proof  
 Of endless rest and immobility ;  
 But if a greater gravitating mass  
 Compels the earth's obedience—such the sun—  
 What shall forbid her to revolve ? And this,  
 The fair analogy suggests, beheld  
 Through all the planetary choir ; scarcely  
 Will childhood hear th' objection, once of weight,  
 When dawning science faintly pierc'd the gloom  
 Of tenfold night, to raise perplexity  
 In learned and in philosophic breasts.  
 No more we ask, why they, if heaven is fix'd,  
 And earth in motion, still our eyes deceive,  
 And show us the revolving sun and stars.  
 Ask not the voyager to disbelieve  
 The motion of his vessel o'er the sea,  
 Because he feels it not, and sees the port  
 Fleeting from view ; while in successive course  
 The shore retires, and to his eager eye  
 New shores, new harbours rise ; the traveller,  
 When he beholds the woods, the cities move  
 Ne'er thinks it real motion : of the eye  
 We learn appearances and trust the sense



To represent them uniformly true,  
In correspondence to their latent cause.

Perchance thou'lt say, the oracles of truth,  
Do not they teach the motion of the sun,  
And the inertness of the steady earth?  
Reason to these and piety command  
An humble deference and prompt belief:  
For he, who built the universe, which now  
His mighty pow'r supports and rules,  
Best knows the fabric, best can speak it's laws.

With these objections former ages us'd  
To press the system by which earth is prov'd  
To wheel her *annual* and *diurnal* orb:  
But not the nature of external things,  
The laws of the material universe,  
Do we contend th' Almighty meant to teach  
His people in the sacred oracles;  
But left to reason and disclosing time,  
And what by MOSES of the world's beginning,  
Is taught, we own obscure, and known concise;  
Less to philosophy than piety  
Devoted: still the motion of the earth  
Is not by Heaven's great oracles denied.  
Will not COPERNICUS, PYTHAGORAS,  
And NEWTON's self, when of Phænomena  
They speak, conform to the appearances,  
Not to the fact and philosophic cause?

Thus the sun rises to philosophers,  
 Alike of PTOLEMY or NEWTON's school;  
 Nor calculation disagrees in ought:  
 Thus to the subject wisely they will speak,  
 And thus distinctly to the pop'lar use;  
 In different style when they explain the truth,  
 And when they speak of visible effects:  
 Yet in this difference consistent still.  
 When of the system, the great law they teach,  
 And all the lucid order, which pervades  
 The works of nature, then, and only then,  
 They quit th' appearance.

~~~~~

## Measure of the Earth.

~~~~~

Now let us seek the *Measure* of the earth.  
 What is the circling line which comprehends  
 It's ample sphere; what the diameter  
 Which, through the centre from the surface, strikes  
 Directly to the superficial point  
 Oppos'd?

When on th' Assyrian plain, the sage  
 Travel'd directly north, and number'd miles,

Thirty

Thirty twice told, and near a seventh beyond,  
 And to the polar star his astrolabe  
 Directed, he observ'd the pole was risen  
 By one degree; thence, southward from the point  
 Whence he commenc'd his journey, travelling,  
 He found the pole by one degree was sunk:  
 Thus long experience taught that sev'nty miles,  
 One half excepted, measur'd a degree  
 On the celestial globe, to the convex  
 Of the earth transferr'd this number multiplied,  
 By the divisions which the quadrant holds,  
 And that four times repeated, gives the earth  
 A great *circumference*; in ample line  
*Twenty-five thousand* miles, if earth possess'd  
 The equal figure of a perfect globe:  
 From thence Archimedean wisdom takes  
 A *third*, and a small portion adds beyond,  
 And thus produces the *diameter*;  
 Which, as a mile computes our distances,  
 Serves to compute the distance of each sphere  
 In the great system of our solar train:  
 Nor mountains, nor impenetrable deeps  
 Obstruct the philosophic eye: which views  
 The axis of our globe, and meets the line;  
 Howe'er to sight inscrutable and lost.

O mass

Great and stupendous, if the groveling soul  
 Cling ant-like to the hillock! But how small  
 If to the starry universe compar'd!

O 3

Even

Thirty



Even a point ; an atom ! Multiply  
 The mighty aggregate of land and sea  
 Ten thousand by ten thousand times ; proceed  
 Till Computation faints beneath the toil,  
 And Industry herself cries out ' no more ;'  
 Still, to a little portion of the whole,  
 Th' amazing aggregate is like the mite  
 To all the planetary worlds : nor toil,  
 Nor penetration with her angel ken,  
 Can note proportion. Nor aerial capes,  
 Nor earth entire, is ought in estimate,  
 When balanc'd with the heavens : greater the speck,  
 Which on the sun-beam dances, when compar'd  
 With Taurus, or the Alps, or Caucasus ;  
 Or on the blade the dew-drop to the sea.

Behold the *Sun* ! how much in magnitude  
 Above the earth !  
 Great as he is, and to so many worlds  
 The source of light, scarce does he seem to us,  
 Full in unclouded majesty reveal'd,  
 Beyond the brief dimensions of a foot.  
 But, should he lift thee to his flaming throne,  
 How from that eminence would earth appear,  
 If visible ; yet to the *Orb* through which  
 Obsequious planets move beneath his reign,  
 How small the *Sun* ! And to the STARRY WHOLE  
 The *Solar System* shrinks dimensionless.

## The Starry Heavens.



WE see by night the lucid host of heaven  
Unveil'd; while through the gloom unnumber'd  
beams

Pour on the eye; and, far as mortal view  
May trace, disclose the palaces of gods:  
Yet not too much trust to appearances,  
Whoever would behold the form of truth  
In all her native beauty: for the sense,  
Fallacious, often deviates; till the soul,  
Exerting her supreme prerogative,  
Dispel the mist: and, brighter than the sun,  
Nature shines forth, reveal'd in all her charms.

If to the sight we trust, whatever star  
Strikes on the vision from yon azure height,  
Revolves in one great orb with daily whirl:  
But if to sight clear Reason lends her ray,  
Then varied distances and different ranks,  
And divers motions are beheld distinct.

Yet, though the motion, distance, magnitude  
Of heavenly bodies thus diversified,  
'Midst order, feasts with rich variety

The still-enquiring, still-delighted mind,  
 We dream not that the stars choose each his course;  
 As in the sea the finny habitants  
 By native impulse, and self-moving will:  
 For, to the movements of the living world,  
 Free range agrees, direct or retrograde;  
 Now to the right, now to the left inclin'd;  
 Now straight, now curve; irregular and prompt  
 To every changing impulse of the sense:  
 And intervals of sweet returning rest  
 Are their's; but ever circular the curve,  
 Constant the progress of those stars which move,  
 And undisturb'd the station of the fix'd,  
 Through the long period of a thousand years;  
 Except so far as the eternal law  
 Of gravitation's universal force  
 May act on these; incredible how slow.  
 For not unsteady or precarious laws  
 Rule heaven; nor space uncertain; nor return,  
 At vague, inconstant per'od, is allow'd  
 To the unwearied messengers of light,  
 The planetary worlds: and, as the form  
 Of animals by Nature's plastic hand  
 Is to their several situations turn'd;  
 Their temper, life and services design'd;  
 So to the movement of the stars is giv'n  
 Adapted shape, compact and uniform,  
 Free for progression; aptly to diffuse  
 Light on all sides ordain'd; nor less to suit

Rotation,

Rotation  
Sublime

Since,  
 Nor *char*  
 Worship  
 But fix'd  
 Their mo  
 Remains  
 Impel, d

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 First, *Me*  
 Beneath  
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 In the fw  
 Then the  
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 Is *Venus*,  
 Borrows  
 Sovereign  
 Next *Ma*  
 Of vivid  
 Then *Sat*  
 And lastly  
 Slow mo  
 Far above



Rotation, than for periodic course ;  
 Sublime and beautiful, a sphere complete.

Since, therefore, nor spontaneous motion reigns,  
 Nor *chance* the stars directs—*ideal being*  
 Worshipped by credulous impiety—  
 But fix'd their periods, and unchang'd their laws,  
 Their motion constant, figure uniform ;  
 Remains that *one eternal mind* preside,  
 Impel, direct, and limit all their course.

See we how in the midst *five* shining orbs  
 Appear to wander, circling round the *Sun*.  
 First, *Mercury*, rarely beheld, and hid  
 Beneath the neighbouring radiance of his beam ;  
 Seeming to glance upon the fervent goal  
 In the swift flight of his impatient wheel :  
 Then the bright Star, the harbinger of day,  
 Which when she leads the lovely hour of *eve*,  
 Is *Venus*, queen of joy : inferior *Earth*  
 Borrows the cheering ray, O *Sun*, from thee,  
 Sovereign and parent, animating all.  
 Next *Mars* of fiery red ; and *Jupiter*,  
 Of vivid lustre in his ample orb :  
 Then *Saturn* with his faint and livid ray ;  
 And lastly, *Georgium Sidus*, lately found,  
 Slow moving in the system's utmost bound.  
 Far above these, the GLORY OF THE HEAVENS,  
 With

With thousand lights, sheds splendour through the  
dusk,

And drives far off the horrors of the night ;  
Left darkling, the lost traveller should err,  
Or the wide seas the mariner deceive ;  
And that the wisdom, goodness, power of GOD  
To mortals may be known ; and nature speak  
Her great Creator ; and through all her bounds  
His every work or learn, or teach his praise.  
What, then, with these examples may become  
Man, before whom the *Deity* hath set  
This boundless scene ? Shall he not cultivate  
The seeds of truth and peace ? Shall he not dwell  
With genuine, active piety, and gain  
The habit and the temper of that life,  
For which he is design'd ?—The life of gods !  
Looking sublime to the high seat of bliss,  
Where neither sickness, grief, nor anxious care  
Disturb the pure serene ; but ease secure,  
And life, unknowing of decay or end,  
And peace, and love reside ; and the great power  
Eternal *virtue*, driven by our crimes  
From earth to her corruptless mansion—heaven.  
Hither our journey ; here our sacred port ;  
Hither disdaining every obstacle  
Of terror or allurements, let us tend.

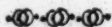


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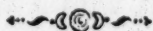
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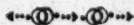
## The Periods of the Planets.



THE PERIODS of the PLANETS to discern,  
 Nice is the toil, but not inglorious.  
 First, winged MERCURY in haste revolves;  
 Three months, with little space beyond, include  
 His circuit: VENUS, in an ampler orb,  
 Measures *eight months*: MARS, free, expatiates  
*Two lunar years*: imperial JUPITER  
 Nearly *twelve years*, such as our annual course  
 Numbers, within his mighty orb includes:  
 While SATURN asks thrice ten to move his round:  
 And GEORGIUM SIDUS to the marge exil'd,  
 Has eighty-three to fill his slow career.



### The Sun turns on his Axis.



WE said the SUN upon his axis turn'd:  
 This by apparent spots is manifest,  
 Retiring and returning to our view,  
 At measur'd periods on his orb of fire:

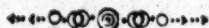
Sometimes



Sometimes so wide encroaching, that the earth  
Measures one *third* of their diameter.  
Yet not the Sun by their encroachment shines  
With lessened beauty, or appears to lose  
Of heat or splendour : as a grain of sand  
Deforms not the bright surface which presents,  
In ample model, this our globe of earth.



### Proportion of Light and Heat on the Planets.



SEVEN times the light, which gilds our moon,  
inflames

The fiery sphere of ardent *Mercury* :  
While *Venus*, brilliant with a double share  
Of solar splendor more than beams on us,  
Graces the heavens : *Mars* has but half our light  
Pour'd on his dense, refractive atmosphere :  
And *Jupiter* gains scarce a *thirtieth* part ;  
Yet quick returns compensate, and a night  
Illumin'd by four moons, assiduous still  
To shed successive light, and cheer his globe  
On ev'ry side ; except the Poles alone ;  
And these the sun never abandons far,

But

But sojour  
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*Saturn* rec  
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Is but the  
Dear boy,

\* Such as t  
The distance  
Such is the sq  
The abov  
May, 1618.

But sojourns on the horizontal marge  
 In kind vicinity, indulging light :  
*Saturn* receives about a *ninetieth* part  
 Of the all-cheering light on earth diffus'd ;  
 But sev'n refulgent moons solace the sphere,  
 With distances and periods strictly true  
 To the great law\*, O KEPLER, trac'd by thee !  
 And how illustrious is the ring, which girds  
 His ample orb ! Amazing zone of light !  
 Auxiliar to the circling moons that wait  
 Upon the wand'ring star. Compar'd with earth's,  
 The light and heat that *Georgium Sidus* feels  
 Is but the fifteen score and seventieth part.  
 Dear boy, adieu.

\* Such as the cube of numbers that express  
 The distance of each planetary sphere,  
 Such is the square of periodic time.

The above law was discovered by Kepler, on the 13th. of  
 May, 1618.



A FEW  
OBSERVATIONS  
On Music.

---

E'en age itself is cheer'd by music;  
It wakes a glad remembrance of our youth,  
Calls back past joys, and warms us into transport.

Roller.

~~~~~

IN music the number of notes is 7, which are named as the first 7 letters of the alphabet.

If you begin with A, and strike 7 successive notes, you will come again to A; but this A is not the same note as that with which you began; it is an *octave* to it. These 7 notes are those of a peal of 7 bells: when there are 8 bells, the smallest is an *octave* to the largest: but if musical instruments contained no other than these 7 notes and their octaves, they would produce no better melody than that, called ringing changes; or, at best, only a simple tune.

To

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*octave*, c

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*This is n*

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KEY, o

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and *thir*



To render musical instruments more comprehensive, middle notes, named *half-notes* were introduced, each  $\frac{1}{2}$  a tone higher than the note below it; and therefore  $\frac{1}{2}$  a tone lower than the note above it: in consequence of this arrangement, the *whole octave*, consists of 12 *half-notes*.

Perhaps you will ask, If there are 7 whole notes, and a  $\frac{1}{2}$  note between every two, why does not the scale consist of 13 half-notes? 'Tis a natural question: but the reason why there are only 5 half-notes, is, that in this natural scale, there are two places which require no half-note, because they are only  $\frac{1}{2}$  a note asunder.

Sing 8 successive notes, from the lowest to the highest, or from the highest to the lowest, and you will, without knowing it, make but  $\frac{1}{2}$  a note in two different places: namely, between the *third* and *fourth*, the *seventh* and *eighth*: thus, 1.2.3.4.5.6.7.8  
This is named the SHARP KEY, or MAJOR KEY.

These half-notes are not confined absolutely to the places where you see them in the foregoing example: the ear will bear them in the following position: 1.2.3.4.5.6.7.8 This is termed the FLAT KEY, or MINOR KEY.

Above, you see the  $\frac{1}{2}$  notes lie between the *second* and *third*, the *fifth* and *sixth*. Dot these notes on  
the

the harpsichord, beginning at A; touching none of the short keys, and you will find, that the ear will not only bear it, but that there is a sweetness in the effect, when contrasted with the first manner. I say first manner; for both are the same Diatonic Scale\*, consisting of the same number of half-notes.

Let the key-note be what it may, the keys are always known by the *third* being *sharp* or *flat*: that is, by the  $\frac{1}{2}$  tone lying between the *third* and *fourth* note, or between the *second* and *third* note.

Observe, that any of these notes, or  $\frac{1}{2}$  notes on the harpsichord, may be made the first note of the scale, in either manner; which first note gives name to the key in which the piece is modulated, and with which the piece must be concluded. Whatsoever note you make the key-note, the  $\frac{1}{2}$  notes must fall in their proper places: and this is not very difficult, as the instrument consists entirely of  $\frac{1}{2}$  notes.

Before you try the experiment, it is necessary you should know, that every  $\frac{1}{2}$  note takes occasionally either the name of the note above it, or of

\* It is named the *Diatonic* Scale, to distinguish it from the *Chromatic* Scale, which ascends and descends by half-notes. The first of these modes is the *Major Key*; the second, the *Minor Key*; there are no more than *two Keys*.

that

that below  
G sharp  
G, or it  
natural A

If you  
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and but  $\frac{1}{2}$   
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If you  
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sharp third,

that below it: thus the  $\frac{1}{2}$  note between G and A is G *sharp*; that is,  $\frac{1}{2}$  a tone higher than the natural G, or it is A *flat*, that is,  $\frac{1}{2}$  a tone lower than the natural A.

If you begin with C, and proceed upward note by note, you will find the  $\frac{1}{2}$  notes lie in their proper places; namely, between the *third* and *fourth*, and between the *seventh* and *eighth*, without the necessity of introducing any of the short keys.

If you make D your first note, in order to make two half-tones according to the *major key*, you must take in F *sharp*; and, when you come up to C, you must take in the C *sharp*: because, there must be a whole tone between the *sixth* and *seventh*, and but  $\frac{1}{2}$  a tone between the *seventh* and *eighth*. For the above reasons, when a piece of music is composed in *b* with a *major third*, there is this mark prefixed,  $\sharp$  on or between the lines where G and F are pricked: signifying that these two notes are *sharp*.

If you make B *flat* your fundamental note, and proceed upward in the *major key*, you will find yourself obliged to take in E *flat*; so that B and E must be marked flat; thus, D, at the beginning of the movement: nevertheless this movement has a *sharp third*, and is consequently in the *major key*:

P

but



but if with the same first note you change the  $\frac{1}{2}$  notes according to the *minor* manner, then, A, B, D, E and G will be *flat*.



### Cliffs.

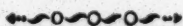


MUSICAL notes are made on, or between 5 principal lines; to which there are occasionally added 1 or 2 more.

To avoid the inconveniency of adding too many of these occasional lines, cliffs were invented; by which any particular line, or interval may be made the place of any note on the scale.

If I make the place of G the lowest line but one, as in the common *triple cliff*, then the note in the interval above, will be A; and that in the interval below will be F, and so of the rest.

If I make the upper line but one, F, as in the *bass cliff*, then the interval above will be G, and the interval below will be E, &c.



### Time.



IN music there are but two distinctions of time: namely, *common time* and *triple time*.

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*dicular l*

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*A bar is the space between any two of the perpendicular lines, drawn across the five ruled lines.*

In *common time*, when the notes in a bar are of equal length, the number is even.


In *triple time*, when the notes in a bar are of equal length, the number is odd.


Suppose the following figures to be notes; 1234, 1234, 1234, &c. If you sing these four figures to any tune you please, and beat with your hand, whenever you come to the 1, you will sing in *common time*. If you change your melody to three figures; thus, 123, 123, 123, &c. and beat as before, you sing in *triple time*.

As to the length of each kind of note, you may name the

Open circle                      o      a note.

When it has a tail                    a  $\frac{1}{2}$  note.

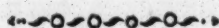
When the head is filled              a  $\frac{1}{4}$  note.

When the tails are once tied       an  $\frac{1}{8}$ th.

When twice tied                      a  $\frac{1}{16}$ th. &c.

Thus, the name expresses the relative proportion of every note.

## Musical Harmony.



MUSICAL harmony depends on a coincidence in the vibrations of the sounding bodies.

No two strings can vibrate in equal times unless they be tuned in exact *unison*; and *unison* is the only perfect concord. Other chords are more or less perfect, as their vibrations coincide more or less frequently.

The next chord in degree of harmony is the *Octave*, because, as it vibrates in half the time, the tones coincide at every *second* vibration.

If a musical string of any length, be divided by a bridge into two equal parts, each half will sound an OCTAVE higher than the tone of the whole string.

If the bridge is removed, so as to leave 3 parts of the whole string on one side, and two on the other, the longer part will sound a FIFTH to the open string: and if they are sounded together, there would be a perfect coincidence at every *third* vibration. The FIFTH, therefore, is the next in rank.

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Move the bridge, so that there shall be  $\frac{3}{4}$  on one side: and the longer part will sound a **FOURTH** to the whole string, and their vibrations will unite at every *fourth* return.

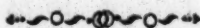
Again: move the bridge, so as to leave  $\frac{4}{5}$  on one side: the longer division will sound a **MAJOR THIRD** to the open string, and the vibrations of two strings in this proportion, will coincide at every *fifth* repetition.



**DISCORDS** are the tones where vibrations never coincide: they are, nevertheless, of indispensable use in music as a foil; and as the means of introducing the concord to advantage.



A Sketch of  
*A N A T O M Y.*

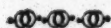


Search through the whole compass of external nature, and overlook not the far more surprising curiosities, which abound in the composition of your own body.

HERVEY.



**Some anatomical Terms explained.**



FIBRES, small animal threads.

TRANSVERSE, lying across.

MEMBRANE, a web.

CARTILAGE, a gristle.

LUBRICOUS, slippery.

FLEXIBLE, pliant.

ELASTIC, having the power of a spring.

LARYNX, the entrance of the windpipe.

ARTICULATION, a joining.

LIGAMENT, a binder.

MUSCLES, the instruments of voluntary motion.

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\* The Ven  
Portæ, the g

TENDINOUS, sinewy.

INTEGUMENTS, coverings.

THORAX, the chest.

ABDOMEN, that part of the belly which is between  
le nombril et les parties honteuses.

NERVES, the organs of sensation.

SPINE, the backbone.

MEDULLARY, marrowy.

VERTEBRÆ, joints of the backbone.

ARTERIES, large blood-vessels.

SPIRAL, winding upward.

PULSATION, a driving forward.

VENTRICLE, a cavity.

AORTA, the great artery.

DILATATION, width.

VEINS, blood vessels.

CAPILLARY, small, like hair.

REFLUENT, returning.

VENA CAVA, the largest vein.

VENA PORTÆ\*, the gate vein.

\* The *Vena Portæ* enters the liver through two eminences, named,  
*Portæ*, the gates.



**VENA PULMONARIS**, the vein of the lungs.

**AURICLES**, two caps, like ears, covering two ventricles of the heart.

**CORONARY ARTERIES**, those which surround the heart to nourish it.

**VISCERA**, the bowels.

**LYMPH**, a clear fluid.

**LACTEAL VESSELS**, are so called because they contain a milky fluid.

**BRAIN**, all the soft substance contained within the skull.

**LUNGS**, (i. e. empty, being filled with nothing but wind), the lights.

**HEART**, the source of vital motion.

**STOMACH**, a cavity in which the food is digested.

**LIVER**, one of the entrails—possibly so called, because it was esteemed the fountain of life.

**SPLEEN**, the milt; a bowel under the left short ribs: the use of which is scarcely known.

**PANCREAS** (i. e. all flesh), the sweet-bread.

**KIDNEYS**, the chief organs of urinary secretion.

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GLANDS, flesh kernels, whose use is to secrete fluids from the mass of blood for divers purposes.

INTESTINES, the bowels.

DURA MATER, the outside skin which encompasses the brain.

CEREBRUM, the forepart of the brain.

CEREBELLUM, the back part of the brain.

CRANIUM, the skull.

LOBE, any roundish body.

TRACHEA\*, the windpipe, extending from the mouth to the lungs.

DIAPHRAM, or MIDRIF, a membrane which separates the heart and lungs from the lower belly.

VALVE, a falling door.

PYLORUS, the lower orifice that lets the meat out of the stomach into the intestines.

CARDIA, the pit of the stomach.

ŒSOPHAGUS, the gullet; that membranous canal which conveys the aliment from the mouth to the stomach.

\* The entrance of the *Trachea* is named the *Larynx*: the rest, *Apera Arteria*.

**DUODENUM**, is the first of the three small bowels ;  
so called from it's length, being about 12 fin-  
gers' breadth.

**RUGÆ**, wrinkles.

**CHYLE**, a white fluid.

**HYPOCHONDRIUM**, the region under the car-  
tilages of the lower ribs.

**UMBILICAL VESSELS**, are the veins, arteries,  
&c. which are enwrapped in the boyau du  
nombril.

**BILE**, gall.

**VESICULA FELLIS**, the gall bladder.

**PORUS BILIARIUS**, a duct which passes directly  
from the liver to the *Choledochus*, or common  
duct.

**DUCTUS CYSTICUS**, is a duct which goes from  
the neck of the *Vesicula Fellis* to that part  
where the *Porus Biliarius* joins it.

**ATTENUATED**, thinned.

**PANCREATIC JUICE**, a fluid, separated by the  
glandulous substance of the pancreas, to dilute  
the chyle for the lacteal vessels.

**CONGLOMERATE**, wound round together ; thus,  
a *conglomerate gland*, is one which seems to  
be made of smaller glands, and is uneven on  
it's surface.

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COLON, le gros boyau.

URETERS, tubes that convey the urine from the kidneys to the bladder.

SALIVA, spittle.

VERMICULAR, like a worm.

FÆCES, excrements.

JEJUNUM, the second small bowel; so termed from it's being usually found empty.

MESENTERY, a thick skin, enveloping the bowels.

THORACIC, relating to the breast.

SUBCLARIAN VEIN, a vein under the clavicle, or collar-bone.

SERUM, the watery part of the blood.

REINS, the kidneys.



# ANATOMY

Is the accurate dissection of a human body, in order to discover it's structure and uses.

The human body consists of solid and fluid parts.  
The SOLID PARTS are the

|             |            |
|-------------|------------|
| Bones,      | Membranes, |
| Cartilages, | Nerves,    |
| Ligaments,  | Arteries,  |
| Muscles,    | Veins,     |
| Tendons,    | Ducts.     |



A BONE is a bundle of hard fibres, tied to each other by small transverse fibres. The bones are hard, brittle and insensible; but covered on their inside and outside with an exquisitely sensible membrane, named *periosteum*, except on the skull, where the membrane is named *pericranium*. The bones contain marrow.

There are different sorts of bones in the human body :

- Some are hollow——others solid ;
- Some are small——others large ;
- Some round——others flat ;
- Some plane——others convex or concave.

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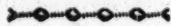
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In the human body, are 247 bones ; namely,

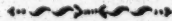
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|--------------------------|---------|----|
| In the head              | - - - - | 67 |
| In the trunk             | - - - - | 56 |
| In the upper extremities | -       | 64 |
| In the lower extremities | -       | 60 |

Though I have said that there are 247 bones in the human body, yet the number is various in various subjects; some say 300 or 307; others, 318; but late writers fix it at most to 250, and commonly to 247, as above.



A CARTILAGE approaches to the nature of a bone, but is smooth, lubricous, flexible and elastic; having no cavities containing marrow, nor any membrane to make it sensible.

The use of the cartilages is to cover the ends of the bones that have motion, to prevent them from being damaged by a continual friction; and to contribute, in a great measure, to the formation of several parts; as the larynx, nose, ears, &c.



LIGAMENTS are white, fibrous, compact substances, more flexible than cartilages, not easily torn, and



and yield but very little when pulled. They form either narrow cords, broad bands, or thin webs. It is generally agreed, that the ligaments are nearly insensible in their natural state, but are capable of very acute pains when diseased: their chief use is to fasten the bones in their articulation.



MUSCLES are distinct portions of flesh, soft and red, compounded of fibres, tendons, nerves, veins, and arteries, all inclosed in a peculiar membrane. The fleshy fibres compose the belly of the muscle, and the tendinous fibres compose the extremities of the muscle. The use of the muscles is to promote voluntary and involuntary motion.

The larger muscles, particularly in the extremities, have substances joined either to one or both ends of them, which substances are termed TENDON; which is less than the muscle itself. The tendon is whitish, firm, hard and tougher than the muscle; and is elastic; for by pulling it breaks. The tendon is not red, from having fewer vessels than the other part of the muscle to which it belongs, as in the white of the eye, but, like that, it becomes red either by injection or inflammation. Dr. Hunter thinks that the fibres of a tendon are only as cords fixed to the ends of the muscles, which are the agents;

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agents; for no one imputes any action to the tendons. The use of tendons is the same as that of muscles.



MEMBRANES are a pliable texture of fibres interwoven together, and expanded, to cover or line any other part. Every distinct part of the body is covered, and every cavity is lined with a single membrane, whose thickness and strength is as the bulk of the part to which it belongs, and as the friction to which it is exposed. The membranes of the body are various and variously denominated; those which serve as integuments, are named *tunics*; those that cover the brain, *meninges*; the skull, *pericranium*; the bones in general, *periosteum*; that which lines the thorax, *pleura*; the abdomen, *peritonæum*; and that which includes the heart, *pericardium*. The muscles, too, are each inclosed in a peculiar membrane; as are the bowels, &c. The uses of the membranes are to cover and wrap up the parts, strengthen them, and save them from external injuries.



A NERVE is a small, but long bundle of very fine hollow pipes, wrapped up in the membranes of the brain from whence these pipes have their beginning.  
The

The nerves are the organs of all sensation : for the eye, the ear, the nose, the tongue, has one pair or more of these nerves from the brain.

The nerves from the spinal marrow are spread through all parts of the muscles and their membranes, and to every point in the superficies of the body ; thereby making the whole sensible. It is supposed that the nerves render the parts sensible by the motion of an exceedingly fine, invisible fluid, named the *animal spirits* ; by which, impressions are communicated to the mind, seated in the brain, from all parts of the animal body. The nerves come forth by pairs, and the human body has forty pair. *Ten pair* proceed from the medullary substance of the brain, and are chiefly distributed to the head and neck. *Thirty pair* from the spinal marrow, proceed through the *Vertebrae*, to all the other parts of the body.



ARTERIES are those pipes, which convey the blood from the heart to all parts of the body.

The arteries branch out into various ramifications, and become invisible at last.

An artery is composed of three coats ; the external and internal are membranous ; but the middle  
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coat is rather muscular; consisting of spiral fibres, which make it elastic, and is the cause of pulsation which is a motion of the arteries only.

The blood being thrown out some and some at a time from the left *ventricle* of the heart into the *aorta*, presses the sides of the artery, and causes an intermitting dilatation thereof; this dilatation is continued by the constant pulsive motion of the blood, and the elasticity of the artery acting on it. Hence the alternate dilatation and contraction of the coats of the artery, is what we name the pulse.



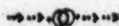
VEINS are only a continuation of the extreme capillary arteries; they convey the reflux blood to the heart. The veins, in their return, unite their channels as they approach the heart; and form at last three large veins; namely, the *Vena Cava*; *Vena Portæ*; and *Venæ Pulmonares*.

The *Vena Cava* carries back to the right auricle of the heart the blood conveyed by the *aorta* to all the parts of the body, except what goes by the coronary arteries of the heart.

The *Vena Portæ* receives the blood carried to the *viscera* of the abdomen, and conveys it to the *vena cava*.

The *Venæ Pulmonares* convey to the left auricle of the heart, the blood carried to the lungs by the pulmonary artery.

The external veins have frequent communications with the internal, and are always fullest when we use most exercise. The veins have no pulse, because the blood is poured into them in a continued stream; and because it moves from a narrow channel to a wider.



The ABSORBENTS are fine vessels, dispersed through all parts of the body, and convey either poisons or nourishment into the circulation.

Of the before-mentioned simple solids, consist the compound organs of life: namely, the

|          |             |
|----------|-------------|
| BRAIN,   | SPLEEN,     |
| LUNGS,   | PANCREAS,   |
| HEART,   | KIDNEYS,    |
| STOMACH, | GLANDS,     |
| LIVER,   | INTESTINES. |



The BRAIN is a soft white mass, where all the organs of sense originate, and in which the soul is supposed

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supposed to reside. It is contained within the *dura-mater*, and divided into the *cerebrum* and *cerebellum*, both in the *cranium*. The human brain is three times as much in quantity as the brain of an ox; it being in general about four pounds weight.



The LUNGS are divided into two large lobes; the right and the left. The substance of the lungs is spongy, and seems composed of an infinite number of lobules of various figures and magnitudes. These are disposed like so many bunches of grapes on the sides of the branches of the *trachea*. When the lungs are inflated, they have some resemblance to the hoof of an ox; convex on the side next the ribs, and concave next the diaphragm.



The HEART is a muscular body, included in the pericardium, and situated in the cavity of the thorax, nearly in the middle of the breast. The heart is the primary organ of the circulation of the blood, and consequently of life. It is, in some measure, of a conical figure, flattened on the sides, round at the top, and oval at the basis. Its situation is nearly horizontal. The pulse is occasioned thus: the fibres of the heart gradually growing shorter, diminish its length, and increase its breadth; they straighten



the cavities of the ventricles, dilate the tendinous mouths of the arteries, determine the valves of the mouths of the veins for the stoppage of their contents, and drive with great force it's contained blood into the dilated mouths of the arteries, in order to it's circulation through the body.

The heart has two motions, called the *systole* and *diastole*.

The *systole* motion is when the heart contracts, and streightens it's cavities.

The *diastole*, is when it dilates, and it's cavities become wide.

The heart has two *ventricles*; the right and the left; and above each ventricle is an *auricle*. The vena cava opens into the right auricle; and the venæ pulmonares open into the left auricle.

It is computed, that each ventricle of the heart holds five ounces of blood (and each is filled and emptied every *systole* and *diastole*); and that there are commonly 80 pulses in a minute; if so, there flows 25 pounds of blood through each ventricle of the heart in a minute. Dr. Keill has shown, that the sum of all the fluids in a man, exceeds the sum of all the solids; and yet the quantity of blood which all the visible arteries of a man will contain, is less than four pounds.

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The pulmonary artery arises from the right ventricle of the heart. The aorta arises from the left ventricle of the heart.

When the right auricle dilates, the blood rushes in from the vena cava. When the right auricle contracts, the blood is thrust into the right ventricle; thence it is driven into the pulmonary artery, by which it is circulated through all the parts of the lungs; and then (being by respiration prepared, reduced, mixed and impregnated by the vital spirit of the air), returned by the pulmonary vein into the left auricle, and from thence into the left ventricle, which, in its contraction, forces it into the aorta, this carries it to all parts of the body; from whence it is returned by the veins to the right auricle.

Thus, by the systole and diastole of the auricles and ventricles of the heart, the circulation of blood is effected.

The length of the human heart is about 6 fingers' breadth; at the base about 5 fingers'; its circumference about 13 fingers.



The STOMACH is situated just under the midriff; and is of a long, wide, and roundish figure; having

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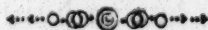
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two orifices; the right named the *pylorus*, and the left, the *cardia*.

The *cardia* joins to the *æsofagus*, by which the stomach receives it's aliments: and the *pylorus* unites to the *duodenum*.

The stomach is made of four coats; the external coat is common to the whole stomach: the second is muscular; being made of straight and circular fibres: the third coat is fine, thin, and wholly nervous: The fourth and inmost coat is full of plajts and *rugæ*; in which is a great number of glands, that separate a liquor, which, besmearing the cavity of the stomach, helps digestion.

By the muscular action of the stomach and fermenting juices, the aliment is dissolved and reduced to a chyle which is protruded through the *pylorus* into the intestines: and this is termed digestion, which is the proper office of the stomach.



The LIVER lies in the right *hypochondrium*; is round, glandulous, and pretty thick; convex on the upper side, and somewhat concave on it's under side. It's forepart is divided into two, where the umbilical vessels enter it. The use of the liver is to separate the bile from the blood.

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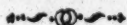
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The vena portæ brings the blood to the liver full of bile, for it's secretion, by the glands of the liver; and the vena cava carries back to the heart the blood which remains.

The pori biliarii going out of the liver, join the ductus cysticus; and with it form one common duct named the choledochus, which carries the gall to the duodenum, to be mixed with the chyle.

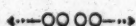


The SPLEEN is of a deep blackish red colour, situated on the left side of the stomach, immediately under the diaphragm, near the ribs, and above the left kidney. It is of an oblong figure. The use of the spleen has been much controverted by authors; but is generally conceived to be an assistant organ to digestion.

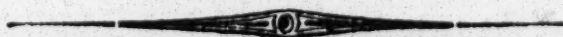


PANCREAS is a large gland of the conglomerate sort. It lies across the abdomen, and reaches from the liver to the spleen. The glandulous substance of the pancreas separates a fluid, called the pancreatic juice, which is conveyed by a duct to the duodenum, to dilute the chyle, that it may more easily enter the mouths of the lacteal vessels.

The KIDNEYS are of an oblong figure, each resembling in shape a French bean. The right kidney lies under the liver; the left under the spleen; the concave side is turned inward to the vertebræ; and the convex side outward. The kidneys are connected with the loins, the lower ribs, and the ureters. The use of the kidneys is to secrete the urine from the blood, which is brought there for that purpose by the emulgent arteries; and what remains from the secretion, is returned by the emulgent veins, while the urine secreted is carried off through the ureters to the bladder.



GLANDS are small bodies, formed by the interweaving of vessels of every kind, covered with a membrane; generally composed of an artery. The glands are of two kinds; namely the simple, called conglomerate; and the compound, named conglomerate; the glands differ very considerably in colour, size and figure. Their use is secretion of humours from the blood: thus the glands of the brain secrete the animal spirits; those of the mouth secrete the saliva; those of the breasts, milk; those of the liver, bile; and those of the skin, the insensible matter of perspiration.



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The **INTESTINES** are long tubes, which by several turnings, reach from the pylorus of the stomach to the anus: they are connected with the edge of a membrane, named the **mesentery**; and are six times the length of the body to which they pertain. Their use is, by a peculiar vermicular motion of their spiral fibred coats, to convey along, and extrude the **fæces**, after the **chyle** is strained from them.

The **FLUID PARTS**, are

|            |                       |
|------------|-----------------------|
| The Chyle, | Pancreatic Juice,     |
| Blood,     | Urine,                |
| Saliva,    | Phlegm,               |
| Bile,      | Serum,                |
| Milk,      | Aqueous humour of the |
| Lymph,     | eyes.                 |

~~~~~

**CHYLE** is a milky fluid, into which the food is converted by the *concoction* and *digestion* of the stomach; the *chyle* passing by the pylorus out of the stomach into the first of the intestines, named the *duodenum*, in it and the next, termed the *jejunum*, it mixes with the bile and pancreatic juice; by which means the chyle undergoes a further preparation;



ration; the more alimentary part being hereby refined and separated, is received into the numerous orifices of the first lacteal veins, opening into the said intestines; by these it is conveyed to, and strained through, the glands of the mesentery; whence it is received by a second sort of lacteal veins, and carried to the basin, called the *receptaculum chyli*; where being duly impregnated with the lymph from the *lymphæducts* there poured into it, it is thence carried upward by the thoracic duct, and emptied into the left *subclavian vein*, where it is mixed with the reflux venal blood, descends into the right ventricle of the heart, is thence circulated through the lungs into the left ventricle, and from thence through all the parts of the body: and this is the *animal æconomy*, or ordinary method by which the *blood is removed and life continued*.



BLOOD is a vital stream, proceeding from the fountain of the heart, and circulating constantly through the whole body by the canals of the arteries and veins. If it be viewed with a microscope, it appears to consist of small red globules, swimming in a thin transparent serum; and that each globule is made up of six smaller ones. *Dr. Boerhaave* says, that the mixture, fluidity, heat, and redness of the blood, are owing to, and preserved by, the circulatory motion thereof.

The

The other fluids are all separated from the blood in some part of the body or other, by the glands: thus,

The SALIVA is secreted by glands behind the ears, and the glands of the mouth.

The BILE, you know is separated by the liver.

The MILK is strained off from the blood by the glands of the breasts.

The LYMPH is a fermenting juice, secreted by the small conglobate glands, in several parts.

The PANCREATIC JUICE is a sweet lymphoid fluid, to dilute and refine the chyle.

The URINE is secreted by the kidneys.

PHLEGM is a mucous matter, separated by the glands of the mouth, nose, &c.

SERUM is the aqueous part of the blood, which is not discerned from the blood itself in the body; but taken out, it separates from the coagulated blood, by the diminution of its heat.

The

The AQUEOUS HUMOUR OF THE EYE is discerned from the arterial blood in the vessels of the eye.

Dr. Keill says that

HAIRS, examined with a microscope, are found to have each a round bulbous root, lying pretty deep in the skin, which draws it's nourishment from the surrounding humours; that each hair consists of five or six others, wrapped up in a common tube: they grow as the nails do, each part near the root, thrusting forward that which is immediately above it; and not by any liquor running along the hair, in tubes, as plants grow. Their different colours depend on the different quality and temperament of the humours producing them.



NAILS are of the same nature as the hoofs of beasts; and are nothing but the covers of the skin on the extremities of the fingers and toes, which dry, harden, and lie close upon one another.





## Bones in the Human Body.

### IN THE HEAD ARE SIXTY SEVEN BONES.

In the skull	-	-	8
In the face and upper jaw			13
In the lower jaw	-		1
The teeth	-		32
The bones of the tongue			5
And Those of the internal ear			8

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 67
 

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### IN THE TRUNK ARE FIFTY SIX BONES.

The spine has	-	-	26
The thorax	-	-	27
The pubes	-	-	3

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 56
 

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### IN THE UPPER EXTREMITIES ARE SIXTY FOUR.

The shoulders have			4
The arms	-	-	2
The fore-arms	-	-	4
The hands	-		54

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 64
 

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### IN THE LOWER EXTREMITIES ARE SIXTY.

In the thighs	-		2
In the legs	-		6
In the feet	-	-	52

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 60
 

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## Names of the principal Bones.



The Os FRONTIS, the forehead.

The Os OCCIPITIS, the back part of the skull.

OSSA MALARUM, the cheek bones.

The OSSA NASI, the upper part of the nose.

MAXILLA SUPERIOR, the upper jaw.

MAXILLA INFERIOR, the lower jaw.

The OSSA PALATI, the roof of the mouth.

DENTES, the teeth; adults, if perfect, have 32;  
sixteen in each jaw.

The SPINE has 24 vertebræ; namely,

The neck 7

The back 12 and

The loins 5.

STERNUM, the breast bone.

COSTÆ, the ribs, of which there are 24; twelve  
on each side. The true ribs are the 7 higher  
pair: the short ribs are the 5 lower pair.

CLAVICULA, the collar-bone.

SCAPULA, the shoulder-blade.

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OS HUMERI, the large bone of the arm.

The RADIUS is the larger bone of the fore-arm,  
or *cubit*.

ULNA, the smaller bone of the cubit.

CARPUS, the wrist.

The METACARPUS is that part between the wrist  
and the fingers.

POLLEX, the thumb.

INDEX, the fore-finger.

DIGITUS MEDIUS, the middle-finger.

DIGITUS ANNULARIS, the ring-finger.

DIGITUS MINIMUS, the little-finger.

OS FEMORIS, the thigh-bone; the longest and  
strongest of the whole human frame.

PATELLA, the knee-pan.

TIBIA, the large bone of the leg.

FIBULA, the small bone of the leg.

The TARSUS is the space between the bones of the  
leg and the

METATARSUS, which is the space between the  
tarsus and the toes.

DIGITI PEDIS, the toes.



Letters to a Pupil,  
ON ANATOMY.

~~~~~  
My dear George,

WHEN a master-builder undertakes to erect a magnificent edifice, he begins with the less decorated, but more solid parts; those which are to *support*; or those which are to *contain* the rest.

This order I will follow, in considering the elegant edifice of the human body; an outline of which I am about to delineate for your amusement and information. It has been said, by GALEN, that, To acquaint ourselves with the sublime perfections of the DEITY; and to point out to others his infinite power, his unerring wisdom, and his boundless benignity, is a more substantial act of devotion, than to slay hecatombs of victims at his altar, or to kindle mountains of spices into incense.

This is my opinion; I have always considered it a

Delightful task! to rear the tender thought,  
To teach the young idea how to shoot,  
To pour the fresh instruction o'er the mind,  
To breath th' enlivening spirit, and to fix  
The generous purpose in the glowing breast.

But I wander from the subject. You have a system of *bones*, cast into a variety of moulds, enlarged and contracted into a variety of sizes. All *strong*, that they may commodiously bear up the fleshy machine: yet *light*, that they may not depress you with an encumbered load. *Bored* with an internal cavity, to contain the moistening marrow; and *perforated* with exceedingly fine ducts, to admit the nourishing vessels. Insensible themselves, they are *covered* with a membrane of exquisite sensibility, which warns them of the approach, and secures them from the annoyance of any injurious friction; and, at the same time, preserves the muscular parts from being fretted in their action, by the hard and rough substance of the bones. Their *figures* are always precisely fitted to their uses. They are generally larger at the extremities than in the middle, that they may be joined more firmly, and not so easily dislocated. The manner of their *articulation* is truly admirable, and remarkably various; yet never varied, without demonstrating some wise design, and answering some valuable end. Frequently when two are united, the one is nicely rounded, and capped with a smooth substance; the other is scooped into a hollow of the same dimensions, to receive the polished knob; and both are lubricated with an unctuous fluid, to yield the readiest rotation in the socket.

The *feet* compose the firmest and neatest pedestal; infinitely beyond all that statuary or architecture can accomplish; capable of altering it's form, and extending it's size, as different circumstances require. Besides performing the office of a pedestal, they contain a set of the nicest springs; which help to place the body in a variety of graceful attitudes, and qualify it for a multiplicity of advantageous motions. The undermost part of the heel, and the extremity of the sole, are shod with a tough, insensible, finewy substance. This we call a kind of *natural sandal*. It never wears out, never wants repair, and always prevents that undue compression of the vessels, which the weight of the body, in walking or standing, might otherwise occasion. The *legs* and *thighs* are like substantial and stately columns; articulated in such a manner, that they administer commodiously to the act of walking, yet obstruct not the easy posture of sitting. The legs swell out, toward the top, with a genteel projection; and are wrought off toward the bottom, with neat diminutions; which variation lessens their bulk, at the same time that it encreases their beauty.

The *ribs*, turned into a regular arch, are gently moveable, for the act of respiration. They form a secure lodgement for the lungs and the heart; which being some of the most distinguished and important organs of life, have their residence fortified by this strong semicircular *rampart*. The *backbone*  
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is intended, not only to strengthen the body, and sustain it's most capacious storerooms; but also to bring down that communication of the brain, which is usually termed the *spinal marrow*. As an open channel, it conveys; as a well-closed case, it guards the vital silver; and, by several commodious outlets, transmits the animating treasure into all the inferior parts. Had it been only large, straight and hollow, it might have served these several purposes. But then the loins must have been inflexible, and every man impaled, by nature, on a stake coeval with his existence. To avoid which, it consists of very short bones, closely knit together by intervening cartilages. This peculiarity of structure prevents dislocation; and gives the main pillar of our frame the *pliancy* of an *osier*, even while it retains the *firmness* of an oak. By this mean, it is a kind of continued joint; capable of various inflections, without bruising the soft medullary substance, which fills it's cavity, without intercepting the nervous fluid, which is to be detached from this grand reservoir; or diminishing that strength, which is necessary to support all the upper stories. A formation so very peculiar in any other of the solids, must have been attended by great inconveniencies. Here it is unspeakably serviceable: and for workmanship and situation, is a master-piece of creating skill, never enough to be admired.

Dear George,

My former letter speaks of the *bones*, the *feet*, the *legs*, and the *ribs*; here, I shall notice the *arms*, which, pendent on either side, are exactly proportioned to each other, that the equilibrium of the structure may not be disconcerted. These, being the guards which defend, and the ministers which serve the whole body, are fitted for the most *diversified* and *extensive* operations; firm with bone, yet not weighty with flesh, and capable of performing, with singular expedition and ease, all manner of useful motions. They bend inward and turn outward, they rise upward and stoop downward; they wheel about, and throw themselves into whatever direction we please. To these are annexed the *hands*; and all terminated by the *fingers*: which are not like the arms, of the same length, and of an equal bigness, but in both respects different: which gives them a more graceful appearance, and a much greater degree of usefulness. Were they all flesh, they would be *comparatively* impotent; were they one entire bone, they would be *utterly* inflexible: but consisting of various little bones, and a multitude of muscles, what shape can they not assume? what service can they not perform?—Being placed at the end of the arm, the sphere of their action is  
exceedingly

exceedingly enlarged, and one pair of hands is as serviceable as an hundred. The extremities of the fingers are an assemblage of fine tendinous fibres, most acutely sensible: which, notwithstanding the delicacy of their texture, are destined to almost incessant employ, and frequently exercised among rugged objects. For this reason, they are overlaid with the *nails*, a sort of horny expansion; which, like a serule, hinders the flesh from being ungracefully flattened; and, like a sheath, preserves the tender parts from injurious impressions. In the ministry of the hands, and activity of the fingers, we possess a case of the *finest instruments*,—a collection of the *noblest utensils*; qualifying us for the execution of every work, which the projecting genius can devise, or the lavish fancy crave. To these we are obliged for the beautiful statues, which have often entertained us; and even for that melodious trumpet, which now addresses my ears. These raise the lofty column, and turn the spacious arch. These swell the majestic dome, and adjust the commodious apartment. Architecture's striking beauties and rich benefits are the creation of the human hand. Yielding to it's strength, the tallest firs fall to the ground, and the largest oaks descend from the mountains. Fashioned by the dexterity of the hand, they accommodate the sailor with a *floating warehouse*; and circulate, from *Britain* to *Japan*, the productions of nature, and the improvements of



art.—Obedient to the human hand, metals ascend from their subterranean beds, and compose the most substantial parts of that *curious machine*\*, which transmits far and near, to the monarch's palace, and to the peasant's hut, such treasures of wisdom, as *gold and chrystal cannot equal*. Among the *Egyptians*, the *hand* was the symbol of strength; among the *Romans*, it was an emblem of fidelity; and I think it may, among all nations, be looked upon as the ensign of *authority*. It is the original and the universal sceptre; that which not only represents, but ascertains our dominion over all the elements, and over every creature. Though Providence has not given us the strength of the horse, the swiftness of the greyhound, or the sagacious scent of the spaniel; yet, directed by the understanding, and enabled by the hand, we can subject them to our will; turn them to our advantage; and, in this sense, make them all *our own*. These hands, these *short* hands have found out a way, whereby they can dive to the bottom of the ocean; can penetrate the bowels of the earth; and reach from shore to shore. These *feeble* hands can manage the wings of the wind, can arm themselves with the rage of fire, and press into their service the forcible impetuosity of the waters. How eminent is the dignity! how extensive the agency of the hand! It would require more eloquence,

\* The printing press.

than

than the most famous orator possesses, to display the former; and more pages, than this book contains, to describe the latter.—How greatly, then, are we indebted to our indulgent CREATOR, for accommodating us with this noble, distinguishing, and invaluable member. This is a long letter, my dear boy, but I trust you will not think it *too* long.

Adieu.



As I find, my dear George, that you receive pleasure in reading my letters—I shall continue the subject without further preface.

The *head* is above all; a majestic dome, designed for the residence of the brain. It is framed in exact conformity to this important purpose; ample, to receive it; strong, to uphold it; and firm to defend it. As the head resembles the *general's* tent in an army, or the *monarch's* palace in a city; it has a communication with all, even the most inferior and remote parts of the system; has out-lets and avenues for the ready dispatch of couriers to all quarters; and for the reception of speedy intelligence, on every interesting occasion. It is furnished with lodgements, wherein to post centinels of various

characters, and appointed for various offices. To expedite their operations, whether they are employed in reconnoitering what passes *without*, or examining what claims admittance *within*; the whole turns upon a curious pivot most nicely contrived, to afford the largest, and freest circumvolutions.

This stately capital is screened from heat, defended from cold, and, at the same time, very much beautified by a curious growth of *hair*; which flows from the parted forelock in curls, and hangs, mantling on the cheeks, clustering on the shoulders.—A decoration incomparably more *delicate* than all the orders of architecture can supply, and so perfectly light that it no way encumbers or incommodes the wearer,

While many animals creep on the ground, while all of them are prone in their posture or their aspect, the attitude of man is *erect*.—Which is by far the most *graceful*, has an air of dignity, and bespeaks superiority. It is by far the most *commodious*; fits us for the prosecution of every grand scheme, and facilitates the success of all our extensive designs. It is likewise attended with the greatest *safety*; being, if not less than any other position exposed to dangers, yet more happily contrived to repel or avoid them.

The



The *bones*, to carry on the allusion, are only the *rafters*, the *beams*, the *shell* of the living edifice. I have raised the walls, and laid the floors; I have made the proper divisions, and left the necessary apertures. But, in every finished house, the roof is covered, and the rooms are wainscotted. The sashes are hung, and the doors turn upon their hinges. The grates are fixed, and the stairs ascend. *Within*, the lodgings are furnished; *without*, the front is ornamented. All is rendered commodious for domestic use, and graceful to the external view. This likewise is executed by the great, the divine ARTIFICER. Here are *ligaments*; a tough and strong arrangement of fibres, to unite the several limbs, and render what would otherwise be a disjointed, unwieldy jumble, a well-compacted and self-manageable system. Here are *membranes*; or thin, flexile tunics, appointed to enwrap the fleshy parts; to form a connection between some, and to make a separation between others.

*Arteries*, the rivers of our little world, or the aquæducts of the organised metropolis. Some of which ascend to the head; others spread themselves over the shoulders; some extend to the arms, some descend to the feet, and striking out, as they go, into numberless smaller canals, visit the streets, the alleys, and every apartment of the vital city.—These, being wide at their origin, and lessening as they  
branch

branch themselves, check the rapid impetus of the blood. To sustain this shock, they are endued with uncommon strength; by performing this service, they oblige the crimson current to pass into the *narrowest defiles*, and distribute itself into all quarters. The blood thrown from the heart dilates the arteries, and their own elastic force contracts them. By which means, they *vibrate* in proper places very perceptibly against the finger, bring advices of the utmost importance to the physician, and very much assist him, both in discovering the nature of diseases, and prescribing for their respective cures.—The larger arteries, wherever the body is formed for incurvation, are situate on the *bending side*; lest being stretched to an improper length by the inflection, their dimensions should be lessened, and the circulating fluid retarded. They are not, like several of the considerable veins, laid so near the surface, as to be protusive of the skin; but are deposited to a *proper depth* in the flesh. This situation renders them more secure from external injuries. It conceals, likewise, those starts of the pulse, which, if apparent, would discompose the most sedate, and disfigure the most comely countenance. Could we cast our eye upon the river, which runs through the neighbouring meadow, we might observe several mills intersecting the stream. The waters at those places, if not entirely stopped, drain away very slowly. In consequence of this obstruction, the  
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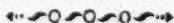
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lower channel would be sunk dry, and the upper ones swelled into a flood. To obviate both these inconveniences, *low-shots* are provided; which, carrying off the surcharge, prevent a glut above, and supply the banks below. In those parts of the body, which are most liable to pressure, much the same expedient takes place. The arteries *inofculate*; or breaking into a new tract, they make a little circle, in order to return and communicate again with the main road. So that, if any obstacle blocks up or straightens the direct passage, the current, by diverting to this new channel, eludes the impediment, maintains an uninterrupted flow, and soon regains it's wonted course.

I remain sincerely your's.



Dear Pupil,

THE *veins* are appointed to receive the blood from the arteries, and re-convey it to the heart. Small at their rise, and enlarging as advancing, they are void of pulsation. In these, the pressure of the circulating fluid is not so forcible as in the arterial tubes: for which reason, their texture is flighter. Such an exact *æconomist*  
is



is nature, even amidst all her *liberality*! In many of these canals, the current, though widening continually, and acquiring a proportionable increase of gravity, is obliged to push it's way against the perpendicular. By which circumstance it is exposed to the hazard of falling back, and overloading the vessels, if not of suppressing the animal motion. For a security against this danger, *valves* are interposed at proper distances; which are no hindrance to the regular passage, but prevent the reflux, sustain the augmented weight, and facilitate a progress to the grand receptacle. This auxiliary contrivance comes in, where the blood is constrained to climb: but is dismissed where the steep ascent ceases, as such a precaution would be needless. Here are *glands*, whose office it is to filtrate the passing fluid. Each of these glands is an assemblage of vessels, complicated, and interwolved, with seeming confusion, but with perfect regularity. As some kind of sieves transmit the dust, and retain the corn; others bolt out the meal, and hold back the bran; so some of these glandulous strainers draw off the finest, others the grossest parts of the blood. Some, like the distiller's alembic, *sublimate*; others like the common sewers, *defecate*. Each forms a secretion, far more curious than the most admired operations of chymistry; yet all necessary for the support of life, or conducive to the comfort of the animal. Muscles, woven in

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Nature's nicest loom; composed of the slenderest fibres, yet endued with incredible strength; fashioned after a variety of patterns; but all in the highest taste for elegance, conveniency, and usefulness. These with their tendons annexed, constitute the instruments of motion. The former contracting their substance, operate somewhat like the pulley in mechanics. The latter resembling the cord, are fastened to a bone, or some partition of flesh; and following the muscular contraction, actuate the part into which they are inserted. This and all their functions they execute, not like a beast of burden, but quick as lightning. *Nerves* surprisngly minute tubes, derived from the brain, and permeated by an exquisitely subtle fluid: which gliding into the muscles, sets them on work; diffuses the power of sensation through the body; or, returning upon any impression from without, gives all needful intelligence to the soul. *Vesicles*, distended with an unctuous matter in some places, compose a soft cushion for nature; in other places, they fill up their vacuities, and smooth the inequalities of the flesh. Inwardly, they supple the several movements of the active machine; outwardly, they render it's appearance plump, well-proportioned and graceful.

The *skin*, like a curious furtout, exactly fitted, is superinduced over the whole. Formed of the  
most

most delicate net-work; whose meshes are minute, and whose threads are multiplied even to a prodigy. The meshes so minute, that nothing passes them, which is discernable by the eye; though they discharge, every moment, myriads and myriads of superfluous incumbrances from the body. The steam, arising from the warm business transacted within, is carried off by these real, though imperceptible funnels; which constitutes what we usually term insensible perspiration. The threads so multiplied, that neither the point of the smallest needle, nor the incomparable nicer spear of a gnat, nor even the invisible lancet of a flea, can pierce any part, without causing an uneasy sensation and suffusion of blood; consequently not without wounding, even by so small a puncture, both a nerve and vein\*.

The veins, either pervading or lying parallel with this fine transparent coat, beautify the human struc-

\* A *blood-vessel* at least. Compared with the vessels, the fine *filmy threads*, which, on some bright, autumnal morning, float in the air, or hang on a stubble, are as *large* as a bell-rope, or *bulky* as a cable. Such tubes, one would think, would *burst* at every breath we draw; or even *break* with their own fineness. Yet they are the conduit pipes, which convey the vital fluid from and to the grand reservoir. And so exquisitely admirable is their texture, that they will outlast the strength of lead, or the heart of oak; *these* wearing away; *those* growing stronger, by use.

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ture; those parts especially, which are most conspicuous, and intended for public view. The pliant wrist, and the taper arm, they variegate with an inlay of living sapphire. They spread vermillion over the lips, and plant roses in the cheeks; while the eye, tinged with jet, or sparkling with the blue of heaven, is fixed in an orb of polished crystal. Infomuch that the earthly tabernacle exhibits the nicest proportions, and richest graces; such nice proportions, as afford the most correct model for statuary; such rich graces, as the canvas never bore, as painting imitates in vain.

Perhaps, my dear boy may think, that a course of incessant action must *exhaust* the fluids; waste the solids; and (unless both are supplied with proper recruits) at length totally destroy the machine. For this reason it is furnished with the powers of nutrition: *teeth*, the foremost, thin and sharp, fitted to cut off a convenient portion for the mouth; the hindmost, broad and strong; indented like a millstone, to grind whatever is transmitted to their operation. Were the teeth covered with a membrane, the act of *chewing* would occasion uneasiness; and eating a hard substance might lacerate the tegument. Were the teeth without a covering, they would suffer from inclemencies of the air, and be liable to the penetration of liquors. Thus they would soon become unfit for service,  
and

and perhaps perish. To guard against these disadvantages, a neat *enamel*, white as ivory, and harder than the bone itself, *glazes* them; which renders them an ornament to the mouth; secures them from injuries; and exempts them from pain in the office of mastication. As the rims and cushions of a billiard-table keep the ball from flying off, and send it into the green area, for repeated essays of skill, so the lips prevent the food from slipping out of the mouth; and assisted by the tongue, returns it to the attrition of the grinders. While the *lips*, in concert with the cheeks, are thus employed, their motion compresses the circumjacent glands; and from innumerable little orifices, a thin *pellucid fluid* exudes, which moistens the attenuated food, and prepares it for more easy digestion. When the mouth remains inactive, these fountains of spittle are, in a manner, closed; but when it is exercised either in speaking or eating, they never fail to give a sufficient quantity of moisture; it being at such times peculiarly necessary.

I am sincerely yours.



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## My dear Boy,

WHEN the soldier charges his carbine, the cartridge could not make it's way to the bottom, without the protrusion of the rammer. Neither would the food, which we receive at the mouth, descend by the force of it's own weight, through a narrow and clammy channel, into the stomach. To effectuate, therefore, and expedite it's passage, muscles, both *straight* and *circular*, are provided. The former enlarge the cavity of the throat, and afford a more easy admittance; the latter, closing behind the descending aliment, press it downward, and finish the deglutition. Before the food enters the gullet, it must of necessity pass over the orifice of the *wind-pipe*; consequently, must be in danger of falling upon the lungs; which would, if not entirely obstruct the breath, yet occasion violent coughing, and great inconvenience. To obviate this, the Great CONTRIVER has placed a *moveable lid*, which is shut close, when the smallest particle of food advances to enter the stomach: but the instant the morsel is swallowed, the lid is set loose, and remains open. By this two-fold artifice, the important passage is barred against any noxious approaches; yet is left free for the necessary accession of air, and commodious for the purposes of respiration.

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When the malster prepares his grain for the transmutations of the brewhouse; he lets it lie several hours sleeping in the cistern, before it is fit to be spread upon the floor, or dried upon the kiln. The meat and drink likewise must remain a considerable time in the *stomach*, before they are of a proper consistence and temperature, either for the tender coats, or the delicate operation of the bowels. For which purpose that *great receiver* is made, strong to bear, capacious to hold, and so curiously contrived, as to lay a *temporary embargo* upon it's contents. Here they are lodged in the very centre of warmth, and concocted by a kindly combination of heat and humidity. Here they are saturated with fermenting or diluting juices; and kneaded, as it were, by the stomach's motion, and compression of the neighbouring parts. So that the smallest fragment is separated; the whole is reduced to a *tenuity*, finer than grinding could effect; and all is worked into the smoothest pulp imaginable. From hence it is dislodged by a gentle force; and passes, by a gradual transition, into the cavity of the intestines. Near the entrance, punctual as a porter in his lodge, waits the *gall-bladder*; ready to transfuse on the advancing aliment it's acrimonious but salutary juices: which *dissolve* it's remaining viscidities; *scour* the passage of the intestines; and keep all it's apertures clear. This bag, as the stomach fills, is elevated by the distention; as the stomach empties,

is

is proportionably depressed. The former posture causes a discharge; the latter occasions a suppression of the *bile*. It is furnished also with a valve of a peculiar, but convenient, form; through which the deterfive fluid cannot hastily pour, but must gently ooze. Admirable construction! which without our care or consciousness, prohibits an *immoderate* effusion, yet ascertains the *necessary* supply. Sufficiently charged with this fluid, the nutritive mass pursues it's course through the *intestines*: whose meanders are more curious, than the artful mazes of a labyrinth. The intestines are actuated by an undulatory motion; which protrudes the received aliment; and forces it's milky particles into the *lacteal ducts*. These are a series of delicate *strainers*; ranged in multitudes, along the sides of the winding passage: so nicely framed, as to admit the balmy juices, but to reject the excrementitious dregs. Had the intestines been *straight* and *short*, the food might have gone through them, without resigning a sufficient quantity of it's nourishing particles. Therefore this grandest of all the ducts is artfully convolved, and extended to afford nature an opportunity of *sifting* whatever passes, and of detaining whatever may serve her purposes. Lest such length of entrails should be entangled among themselves, or be cumbrous to the wearer, they are packed into neat folds, and lie within a narrow compass. Although at least six

times longer than the body which contains them; yet they are *lodged* in a *part* of the lower belly; and, in this small space, have sufficient room to execute their important functions. Though the alimentary substance can never mistake its way; yet through some accidental impediment, it may attempt to return backward. In this case, a valve intervenes; and renders what would be extremely pernicious, almost always impracticable. As the whole proceeds in this serpentine course, it is perpetually sending off detachments of *nutritious* juices; in consequence of which, it would lose its soft temperature; and perhaps be hindered from sliding to its final exit. To prevent such an obstruction, glands are posted in proper places; which discharging a *lubricating* fluid, aid the progress of the mass, and renew the secretion of the chyle; till all that remains of the one is cleanly drawn off; and the other—but excuse me.

The *chyle*, absorbed by the secretory orifices, is carried along millions of ducts, and lodged in *commodious cells*. As a traveller, by taking proper refreshment on the road, is more enabled to pursue his journey; so the chyle, diverting to these little inns, is mixed with a diluting, watery substance, which renders it more easy to flow, and more fit for use. From hence it is conveyed to one *common receptacle*, and then mounts through a perpendicular tube.

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When ammunition is transmitted to an army, it generally passes under an escort of able troops. As the chyle is the immediate support of the whole system, it's conveyance is guarded with peculiar attention. The *perpendicular tube*, not having sufficient force of it's own, is laid contiguous to the great artery, whose strong pulsation drives on the creeping fluid, enables it to overcome the steep ascent, and to unload it's treasure at the door of the heart. Here it enters the large vein, in a *slanting* direction, by which it avoids thwarting the purple stream; and the stream, instead of obstructing it's admission, expedites it's passage; instead of being a bar to exclude it, becomes it's wafting vehicle. The entrance is secured by a valve, admirably constructed and happily situated; which *shuts* the aperture against the reflux blood, but opens an easy avenue to introduce this manna of nature. The *blood*, through every stage of it's circuit, having sustained great expences, being laid under contribution, by every gland in the system; and having supplied myriads of capillary vessels with matter, for insensible perspiration; would be impoverished, were it not recruited by this accession of chyle. Yet though *recruited*, it is not *refined*. In it's present crude state it is absolutely unqualified to perform the vital tour, or carry on the animal functions. Therefore, by a grand apparatus of muscular fibres, it is wafted into the *lungs*; and pours ten thousand rills into either

lobe. In the spongy cells of this *laboratory*, it imbibes the influences of external air; it's heterogeneous parts are incorporated; and it's whole substance is made cool, and florid.—Thus improved, it is transmitted to the left ventricle of the HEART; a *strong, indefatigable* muscle; placed in the very centre of the system. Impelled by which, part shoots upward; and sweeps with a bounding impetus into the head. There it impregnates the prolific fields of the brain; and forms those *subtile* spirituous dews, which impart sense to every nerve, and communicate motion to every limb. Part flows downward; rolls the reeking current through all the lower quarters; and dispenses the nutrimental stores, even to the meanest member, and the minutest duct.

Farewell.



OBSERVE, my dear pupil, how the stately *Thames* refreshes the groves, waters the towns on it's banks, and makes the meadows laugh and sing. So with a *richer* fluid, and *more numerous* streams, this human river, the blood, laves the several regions of the body; transfusing vigour, and propagating health, through the whole. But a stream, divided into myriads of channels, and pervading innumerable tracts,

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how shall it be brought to it's source? Should any portion, like waters after a flood,<sup>o</sup> deviate from it's course, or be unable to return, putrefaction would follow—perhaps death might ensue. Therefore, the all-wise CREATOR has connected the extremity of the arteries, with the beginning of the veins; so that the same force, which *darts* the crimson wave through the former, *drives* it through the latter. Thus it is reconducted, without the least extravasation, to the great salient cistern\*. There played off a-fresh, it renews and perpetuates the vital functions.

From the warm heart the sanguine stream distils,  
O'er beauty's radiant shrine in vermil rills,  
Feeds each fine nerve, each slender hair pervades,  
The skin's bright snow with living purple shades;  
Each dimpling cheek with warmer blushes dyes,  
Laughs on the lips, and lightens in the eyes.  
Erewhile absorb'd, the vagrant globules swim  
From each fair feature, and proportion'd limb,  
Join'd in one trunk with deeper tint return,  
To the warm concave of the vital urn.

\* *Solomon makes use of this similitude. Or ever the pitcher be broken at the fountain, or the wheel be broken at the cistern.* The two ventricles of the heart, replenished with blood, are fitly represented by a *cistern*: and the *contractile* force of their fibres, acts like the *water-wheel* in hydraulics. The *pitcher* which receives the water at the spring-head, and conveys it away for the owner's service, may probably signify the *aorta*, and the *pulmonary* artery: whose functions correspond with the uses of such a vessel.

Where



Where two *opposite* currents would be in danger of meeting, a fibrous excrescence interposes; which, like a projecting pier, breaks the stroke of each, and throws both into their proper receptacle. When the wafture is to be *speedy*, the channels either forbear to wind in their course, or to lessen in their dimensions. When the progress is to be *retarded*, the tubes are twined into various convolutions, or their diameter is contracted. Modelled by these judicious rules, guarded by these wise precautions, the living flood never discontinues it's interchangeable tide; but, night and day, still perseveres to sally *briskly* through the arteries, and return *softly* through the veins.

Such are the expedients to elaborate the chyle; to blend it with the blood, and to distribute both through the body; by means of which, the animal constitution is maintained. In youth, it's bulk is increased; in age, it's decays are repaired; and it is kept in tenable condition for the soul, during the space of about seventy years.

These are but a few instances of that contrivance, regularity, and beauty, which are observable in the human frame. Attentive inquirers discover *deeper* footsteps of design, and *more refined* strokes of skill, not only in the grand and most distinguished parts, but

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but in every limb, in every organ ; I may add, in every fibre that is extended, and in every globule that flows.

You see, my love, what a *various*, but *uniform* system, is the body ! You see the greatest multiplicity of parts, yet the most perfect harmony subsists between them all : no one hinders, but each assists the operations of another, and all conspire to the benefit and preservation of the whole. But this system, though endued with a principle of *motion*, and furnished with the powers of *nutrition*, is still without sense. The creation abounds with objects fitted to yield the most refined entertainment. The sun impurples the robe of morning, and stars bespangle the curtains of night. Flowers of silver whiteness, and golden lustre, enamel the ground. Fruits of all radiant hues, and of every delicious taste, hang amiably dangling on the boughs.

Airs also, vernal airs,  
Breathing the smell of field and grove, attune  
The trembling leaves.

But we hear of no capacities for enjoying these delights. Without which, the breath of spring would lose it's fragrance, the whispering grove would degenerate into silence; and nature's book,  
all

all fair and instructive, would be no other than a vast unmeaning blank.

Therefore, the CREATOR, profusely gracious to mankind, has made us an inestimable present of the *senses*; to be the inlets of innumerable pleasures, and the means of administering the most valuable advantages. High in the head, bright as a star in the brow of evening, is placed the *eye*. In this elevated situation, like a centinel posted in his watch-tower, it commands the most enlarged prospect. Consisting only of simple fluids, inclosed in thin tunicles, it conveys to our apprehension all the graces of blooming nature, and all the glories of the visible heavens. How wonderful! that an image of the *hugest* mountain, and a transcript of *diversified* landscapes, should enter the small circlet of the pupil! How surprising! that the rays of light, should paint in their *truest* colours, and *most exact* lineaments, every species of external objects.

The eye is so tender, that a slight accident would greatly injury it's delicate frame. It is guarded, therefore, with a circumspection proportioned to it's texture and use. It is *intrenched* deep in the head; and *barricaded* on every side with a bony fortification. As the incursion of the smallest fly would incommode the polished surface, it is defended by two substantial *curtains*, hung on a slender cartilaginous

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tilaginous rod; which secure it, not barely from blows, and any hurtful attrition, but also from every troublesome annoyance. In sleep, when there is no occasion to exercise the sense, but a necessity to protect the organ, these curtains *spontaneously* close, and never fail to lie shut. At any time they will fly together with a motion, quick as the alarm of fear, I had almost said quicker than thought itself. At all times they are lined with an extremely fine sponge, moist with it's own *dew*; which lubricates the eye-ball, oils as it were it's wheels, and fits it for a course of unwearied activity. At the end of this skinny mantelet (if I may use the military style) is planted a range of bristly *palisadoes*, which keep out the least mote, ward off even the straggling atom, and moderate the potent impressions of the sun-beams.

The *brows* are a kind of natural *pent-house*, thatched and arched with various wreaths of hair. The thatch is intended to divert the sweat from trickling into the eyes, and offending them with it's brine. The *arches* are so finely coloured, and so elegantly turned, that they set off the forehead's polish, and bestow additional grace on the whole countenance. Because, in our waking hours, there is almost an incessant call for these little orbs; they run upon the finest *casters*, rolling upward or downward to the right hand or to the left, with the utmost

most speed, and with equal ease. Which circumstance, added to the flexibility of the neck, render our *two* eyes as useful, as if the whole body, like the living creatures in *St. John's* vision, was *full of eyes before and behind*.

The *ear* consists of an outward porch and inner rooms, with tools of admirable contrivance and finished workmanship. The *porch*, I name that semicircular lodge, which stands somewhat prominent from the head; and is not *soft* as flesh, lest it should absorb the sound rather than promote the repercussion; not *hard* as bone, lest it should occasion inconveniencies when we repose; but of a *cartilaginous* substance, covered with a tight expansion of skin, and wrought into irregular bends and hollows: which, like circling hills, or rocky shores, collect the wandering undulations of the air, and transmit them to the finely-stretched membrane of the tympanum. The *avenue* is secured from the insinuating attempts of little insects, by a *morass* (shall I say?) of bitter and viscous matter; disgusting to their taste, and embarrassing to their feet. The *hammer*, and the *anvil*; the *stirrup*, and the *drum*; the winding labyrinths, and the sounding galleries; these, and other pieces of mechanism, all instrumental to the power of hearing are curious, beyond my powers of description.

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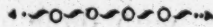
Amazingly nice must be the formation, and inconceivably exact the tension, of the auditory nerves; since they correspond with the smallest tremors of the atmosphere, and easily distinguish their subtle variations. With the gentle gales that fan us, or even with the ruder blasts that assault us, these strings are but little affected. Whereas they are perfect *unisons* with those fine, those *significant* agitations of the air, which the acutest touch is unable to discern. These living chords, tuned by an ALMIGHTY HAND, and diffused through the echoing isles and sonorous cells—these receive the impressions of sounds, and propagate them to the brain. These give existence to the charms of music, and reciprocate the rational entertainments of discourse. These treat my George with the melody of the grove; and afford *me* the superior pleasure of his conversation.

The eye perceives only the objects before it; the ear warns us of transactions, above, below, and all around us. The eye is useless amidst the gloom of night, and cannot carry it's observation through the bolted door, or the closed shutter. But the ear admits her intelligence through the *darkest* medium and *minute*st cranny. The eye is upon duty, only in our waking hours; but the ear is always expanded, and always accessible; a courier who never tires,  
a sentry



a sentry ever in his box. To secure a resource, should a misfortune disable *one* of the hearing or seeing organs, our gracious Maker has given us *duplicates* of each.

Adieu.



Dear Boy,

As there are tremulous concussions impressed upon the air, discernible only by the instruments of hearing; there are also *odoriferous* particles, wafted by the same aerial vehicle, which are perceivable only by the *smell*.—The nostrils are wide at the bottom, that a large quantity of effluvia may enter; narrow at the top, that when entered, they may close their ranks, and act with greater vigour. Fine beyond imagination, are the streams which exhale from fetid or fragrant bodies. The best microscopes, which discover *thousands* of animalcules in a drop of putrified water, cannot bring one individual, among all these legions, to our sight. They sail, in numberless squadrons, close to our eyes, close by our ears; yet are so amazingly attenuated, that they elude the search of both. Nevertheless, so judiciously are the *olfactory* nets laid, and so artfully their meshes sized, that

that they catch these vanishing fugitives; they catch the roving perfumes which fly from the opening honey suckle, and take in the sweets which hover round the expanded rose. They imbibe the balmy fragrance of spring, the aromatic exhalations of autumn, and enable us to banquet even on the *invisible* dainties of nature.

Furnished with these several organs,

Not a breeze

Flies o'er the meadow, not a cloud imbibes  
The setting sun's effulgence, not a strain  
From all the tenants of the warbling shade  
Ascends, but whence our senses can partake  
Fresh pleasure.

Another capacity for frequent pleasure, our bountiful CREATOR has bestowed in granting us the powers of *taste*. By means of which, the food that supports our body, feasts our palate; it first treats us with a pleasing regale; then, distributes it's beneficial recruits. The razor, whetted with oil, becomes more exquisitely keen. The *saliva*, flowing upon the tongue, and moistening it's nerves, quickens them into the liveliest sensation. The sight, the smell, the taste are not only separate sources of delight, but a joint security to our health. They are the accurate inspectors, which examine our food, and inquire whether it be pleasant or disagreeable; wholesome or noxious. For the discharge of this  
office,

office, they are well qualified, and commodiously situated. So that nothing can gain admission through the mouth, till it has undergone the scrutiny, and obtained the passport of them all.

To these, as a necessary supplement, is added the sense of *feeling*; which renders the whole assemblage complete. While other senses have a particular place of residence, this is diffused throughout *the whole* body. In the palms of the hands, on the tips of the fingers, and through all the extreme parts of the flesh, it is quick and lively. The army of *Xerxes*, with all his attendants \*, were but like a few *gleaners* straggling in a field, if compared with those nervous detachments, which pervade the texture of the skin, and minister to the act of feeling. How happily is this sense tempered between the two extremes! Neither so *acute* as the membranes of the eye, nor so *obtuse* as the callous of the heel. The former would expose us to continual pain; render our clothes galling, and even the very *down* oppressive. The latter would benumb the body, and almost annihilate the touch. Nor this alone, but *all* the senses are exactly adapted to their respective offices, and to the exigencies of our state. *Strained* to a higher tone, they would be avenues of anguish; re-

\* The soldiers and attendants of *Xerxes*, amounted to five millions two hundred and eighty thousand!

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*laxed* into greater insensibility, they would be useless incumbrances. How admirable is this provision, to accommodate us with delightful sensations and instructive ideas! The taste, the touch, and the smell, are somewhat *straitened* in the extent of their operations. The ear carries on a correspondence with a *larger* circle of objects. But the sight most amply supplies whatever is wanting in all the other senses. The sight spreads itself to an *infinite* multitude of bodies, and brings within our notice some of the *remotest* parts of the universe. The taste, the touch, the smell, perceive nothing but what is brought to their doors. Whereas the eye extends its observation, as far as the orbit of *Georgium Sidus*, nay, glances in an instant to the inconceivable distance of the stars.

Farewell.



Dear George,

THE crowning gift, accruing from all the senses, is *speech*. Speech makes you a gainer from the eyes and ears of other persons; from the ideas they conceive, and the observations they make. And what an admirable instrument, for articulating

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the voice, and modifying it into speech, is the *tongue*! which having neither bone nor joint, fashions itself, with the utmost volubility, into every shape and every posture, that can express sentiment, or constitute harmony. This little collection of muscular fibres, is the artificer of our words. By this we communicate the *secrets* of the breast, and make our *thoughts* audible. By this we instruct the ignorant, and comfort the distressed; we glorify God, and edify each other: the academic, by this, explains the sciences; and the ecclesiastic preaches the gospel truth. This is likewise the efficient of *music*. It is soft as the lute, or shrill as the trumpet; it can warble as the lyre, or resound like the organ. Connecting the sacred anthem with its tuneful strains, we sooth the cares, and beguile the toils of life; we imitate the angelic choirs, and anticipate, in some degree, their celestial joys. As the tongue requires full scope, and an easy play, it is lodged in an ample cavity; and surrounded with reservoirs of spittle, always ready to distil the lubricating dews. It moves under a concave roof, which serves for a *sounding-board* to the voice; giving it much of the same vigour and grace, as the shell of a violin adds to the language of the strings.

And how gracious is the regulation of *spontaneous* and *involuntary* motion! Was this regulation reversed, what inconveniencies would take place; what

what ruin would ensue! *Inconveniences*; if the discharges of the bowels, or evacuations of the bladder, were independent on our leave. *Ruin*; if the action of the heart required the co-operation of our thoughts, or the business of respiration waited for the concurrence of our will.

The will, in some cases, has not so much as a single vote: in others, she *determines* and *commands*, as an absolute empress: nor is there a monarch upon earth so punctually obeyed, as the queen of the human system. If she but intimate her pleasure, the spirits run, they fly, to execute her orders; to stretch the arm, or close the hand; to furrow the brow, or dimple the cheek. How *easily*, as well as *punctually*, are these orders carried into execution! To turn the screw, or work the lever, is laborious and wearisome: but we move the *vertebræ*, with all their appendant chambers; we advance the leg, with the whole incumbent body; we arise from our seat; we spring from the ground: and though much force is exerted, though a very considerable weight is raised, we meet with no difficulty, we complain of no fatigue.

That all this should be effected without toil, and by a *bare act* of the will, is surprising. But that these motions should be made, renewed, continued, even while we remain *entirely* ignorant of the man-



ner in which they are performed, is beyond measure astonishing. Who can play a tune upon the harpsichord, without learning the difference of the keys? Yet the mind of man touches *every* spring of the human machine, with the most masterly skill; though she knows nothing of her implements, or the process of her operations. We walk, we run, we leap; we throw ourselves into a variety of postures, and perform a multitude of motions; yet are unable to say which nerve should be active; which muscle should swell; or which tendon approximate.

Put a *German* flute into a person's hand, without a master to instruct him, and he will be unable to found the instrument; much less will he be able to soften and extend the sound, just as he pleases. Yet we are self-taught in the method of *forming, regulating, and varying* the voice. With unpremeditated fluency, we give it the languishing cadence of sorrow, or the sprightly airs of joy; the faltering accents of fear, or the elevated tone of anger.

The eye of one who is ignorant of the laws of optics, shall *lengthen* and *shorten* it's axis, *dilate* and *contract* it's pupil, without the least hesitation, and with the utmost propriety; adapting itself, even with mathematic exactness, to the particular distance of objects, and to the different degrees of light.

light. By which means, it performs some of the most curious experiments in the improved *Newtonian* philosophy, without the least knowledge of the science, or a consciousness of it's own dexterity.

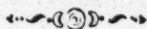
I can never sufficiently admire this multiplicity of animated organs; their finished form, their faultless order. Yet I confess myself struck with greater admiration at the *mysterious* power which the soul exercises over them. Ten thousand reins are put into her hand; she is unacquainted with their use, or their name; she has not learned to distinguish one from another: nevertheless, she manages all, and conducts all, without the least perplexity or irregularity. Great reason had an ancient poet \* to name the HUMAN BODY—the *infinitely varied, and inimitably fine workmanship of a great, supreme, unerring ARTIST.*

*My dear George, Adieu.*

\* Euripides.



# ABBREVIATIONS.



ABBREVIATIONS AND TERMS RELATIVE TO

## Books.



Fol. *Folio*. A book is said to be in folio, when a sheet of paper makes only two leaves, or four pages.

4to. *Quarto*, when one sheet makes four leaves, or eight pages.

8vo. *Octavo*, eight leaves.

12mo. *Duodecimo*, twelve leaves, usually called twelves.

The *Frontispiece*, the picture facing the title-page.

The *Title-page*, the first page of every book, containing the title.

The *Running-title*, the word or sentence at the top of every page.



A *Column*. When the page is divided into several parts by a blank space, or a line running from the top to the bottom, each division is termed a column: as in bibles, dictionaries, news-papers, &c.

*A, B, C,—a, b, c, &c.* are named signatures, and are directions for book-binders to fold and collate the sheets. Many other characters are used for the same purpose; such as \*, †, &c.



## Abbreviations of Latin Words,

FREQUENTLY FOUND IN

### *Printed Books & Manuscripts.*



A. R. *Anno Regni*, in the year of the reign.

Lib. *Liber*, book.

MS. *Manuscriptum*, manuscript.

MSS. *Manuscripta*, manuscripts.

P. S. *Post-scriptum*, a postscript, or something written afterwards.

N. B. *Nota bene*, observe.

v. g. *Verbi gratia*, for instance, if the example is but one word.

e. g. *Exempli gratia*, for example.

viz. *Videlicet*, namely; viz is a corrupt abbreviation.

i. e. *Id est*, that is,

v. *Vide*, see.

Id. *Idem*, the same (author).

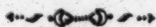
Ibid. *Ibidem*, in the same place (or book),

Nº. *Numero*, in number.

q. d. *Quasi dicas*, as if you should say.

&c. *Et cætera*, and others. When this character is placed after a list of men, it should be called *et cateri*; after a list of women, *et cæteræ*; and after a variety of things in the neuter gender, *et cætera*, as it is usually pronounced,





## Abbreviations in Titles.



J. H. S. *Jesus hominum salvator*, Jesus Saviour  
of men.

G. R. *Georgius rex*, George the king.

A. R. *Anna regina*, queen Ann.

K. G. Knight of the garter.

L. C. J. Lord chief justice.

K. B. Knight of the bath.

K. T. Knight of the thistle.

S. T. P. *Sacræ theologiæ professor*, professor of  
divinity : latin terms for D. D.

D. D. Doctor of divinity.

M. D. *Medicinæ doctor*, doctor of physic.

L. L. D. *Legum doctor*, doctor of laws, that is, the  
canon and civil laws.

J. U. D. *Juris utriusque doctor*, doctor of laws.

B. D.



B. D. Bachelor of divinity.

A. M. *Artium magister*, master of arts.

C. P. S. *Custos privati sigilli*, keeper of the privy seal.

A. B. *Artium baccalaureus*, bachelor of arts.

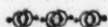
F. R. S. Fellow of the royal society.

R. S. S. *Regiæ societatis socius*, fellow of the royal society.

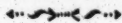
S. A. S. *Societatis antiquariæ socius*, fellow of the antiquarian society.

Single letters in inscriptions upon coins and medals, are generally abbreviations.—The inscription upon our own coin runs thus, GEORGIUS III. DEI GRATIA, M. B. F. ET H. REX. F. D. B. ET L. D. S. R. I. A. T. ET E. That is, *Georgius tertius, Dei Gratia, Magnæ Britannia, Franca, et Hibernia, Rex, Fidei Defensor, Brunswicci et Lunenburgi Dux, Sacri Romani Imperii Archi-Thesaurarius et Elector*. George the third, by the Grace of God, King of Great Britain, France, and

and Ireland, Defender of the Faith, Duke of Brunswick, and Lunenburgh, Arch-Treasurer and Elector of the Holy Roman Empire.



## Abbreviations in *Chronology and Geography.*



A. M. *Anno mundi*, in the year of the world.

Ant. Chr. *Ante Christum*, before the birth of Christ.

A. U. C. *Anno urbis condita*, in the year after the building of Rome. This epocha commences 753 years before the birth of Christ; and is generally used in the Roman history.

A. D. *Anno Domini*, in the year of our Lord. The Christian æra, according to archbishop Usher, A. M. 4004.

O. S. Old Style: the method of computation used in England before the year 1752; when some errors in the calendar were corrected by act of parliament.

N. S.

N. S. New Style.

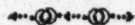
A. M. *Ante meridiem*, in the forenoon.

P. M. *Post meridiem*, in the afternoon.

E. W. N. S. East, west, north, south.

N. L.  $52^{\circ} 45' 3''$ . North latitude, 52 degrees,  
45 minutes, 3 seconds.

Every circle is supposed to be divided into 360 parts, termed degrees; each degree into 60 other parts, named minutes; each minute into 60 seconds, each second into thirds, &c. The  $^{\circ}$  at the top of the figure probably represents the circle, which is thus divided.



## Abbreviations in *Arithmetic and Commerce.*



L. *Libra*, a pound in money.

S. *Solidus*, a shilling.

D. *Denarius*, a penny.

Ob.



Ob. *Obolus*, a halfpenny.

Q. *Quadrans*, a farthing.

Cwt. An hundred weight, 112lb.

Per Cent. *Per centum*, by the hundred.

Per an. *Per annum*, by the year.

Do. *Ditto*, (from *detto*, Ital.) the said.

lb. *Libra*, a pound, twelve ounces of troy weight, used by goldsmiths, apothecaries, &c. and sixteen ounces of avoirdupois.



### Latin Words explained.



*Errata*, errors.

*Corrigenda*, to be corrected.

*Addenda*, to be added.

*Mutanda*, to be altered.

*Delenda*, to be blotted out.

*Pro*, for.

*Lege*, read.

*Dele*, erase.

*Finis*, the end.

*Imprimis*, in the first place.

*Item*, also.

*Ipso facto*, in very fact.

*De facto*, matter of fact.

*De jure*, of right.

*Probatum est*, it is approved.

*Vi et armis*, by force and arms.

*Jure divino*, by divine right.

*Alias*, otherwise.

*Ipse dixit*, himself says so.



# NUMERAL LETTERS.

## NUMBERS

ARE WRITTEN

BY LETTERS AND FIGURES.

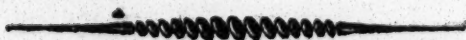
|           | Roman numerals. | Figures. |
|-----------|-----------------|----------|
| One       | I               | 1        |
| Two       | II              | 2        |
| Three     | III             | 3        |
| Four      | IV              | 4        |
| Five      | V               | 5        |
| Six       | VI              | 6        |
| Seven     | VII             | 7        |
| Eight     | VIII            | 8        |
| Nine      | IX              | 9        |
| Ten       | X               | 10       |
| Twenty    | XX              | 20       |
| Thirty    | XXX             | 30       |
| Forty     | XL              | 40       |
| Fifty     | L               | 50       |
| Sixty     | LX              | 60       |
| Seventy   | LXX             | 70       |
| Eighty    | LXXX            | 80       |
| Ninety    | XC              | 90       |
| A hundred | C               | 100      |
|           |                 | Two      |



|                       | Roman Numerals. | Figures.  |
|-----------------------|-----------------|-----------|
| Two hundred           | CC              | 200       |
| Three hundred         | CCC             | 300       |
| Four hundred          | CCCC or CD      | 400       |
| Five hundred          | D or ID         | 500       |
| Six hundred           | DC              | 600       |
| Seven hundred         | DCC             | 700       |
| Eight hundred         | DCCC            | 800       |
| Nine hundred          | DCCCC or CM     | 900       |
| A thousand            | M or CIJ        | 1000      |
| Five thousand         | IJJ             | 5000      |
| Ten thousand          | CCIJJ           | 10,000    |
| Fifty thousand        | IJJJ            | 50,000    |
| A hundred thousand    | CCCIJJJ         | 100,000   |
| Five hundred thousand | IJJJJ           | 500,000   |
| A million             | CCCCIJJJJ       | 1,000,000 |

The Romans expressed any number of thousands, by a line drawn over a numeral, less than a thousand:  $\overline{V}$  denotes five thousand,  $\overline{LX}$  sixty thousand.

So likewise  $\overline{M}$  stands for one thousand times a thousand, or a million;  $\overline{MM}$  two millions, &c.



## Numeral Letters Explained.

MDCLXVI 1666.

←O→

M. Denotes mille, 1000.

D. Dimidium mille, half a thousand, or 500; or it is probably the half of CIJ.

C. Centum, 100.

L. Represents the lower half of the Saxon C; and consequently expresses 50.

X. Resembles two Vs, one upright, the other inverted; and signifies 10.

V. Stands for 5, because it's sister letter U is the fifth vowel.

I. Signifies 1, probably because it is the plainest and simplest character in the alphabet.

If two or three of these characters are placed together, and the less number is placed before the greater, the value of the less is to be deducted from the greater: as IX, 9; XIX, 19; CD, 400; CM, 900, &c.

U

# ENGLAND

## DIVIDED INTO CIRCUITS.

|                  |                                                                                              |
|------------------|----------------------------------------------------------------------------------------------|
| <b>Northern.</b> | Yor. Dur-Nor. Cum-Lancas. <i>and</i> West.                                                   |
| <b>Midland.</b>  | North. Rut-Linc-Der. No-War. Leicest.                                                        |
| <b>Western.</b>  | Cor. De-Dor. <i>with</i> Somer-Wilt. Ham.                                                    |
| <b>Portfolk.</b> | Nor. Suf-Hun. Bucks. Bedford <i>and</i> Cam.                                                 |
| <b>Oxford.</b>   | Shrop-Glouces. Ox-Staffordshire, Ber.<br><i>With</i> Monmouthshire, Wor'ster <i>and</i> Her. |
| <b>Home.</b>     | Sur-Suffex, Kent, Hertford <i>and</i> Efs.                                                   |
| <b>EXCLUDED.</b> | Middlesex <i>with</i> the old tea-pot *Ches.                                                 |

---

WALES contains of circuits four,  
Which you may learn in half an hour.

*The N. E. Mont-Flint and Denbigh,*  
*The N. W. Car-Meri. Ang-I :*  
*The S. E. Glamor-Rad. Brecknock,*  
*The S. W. Cæmarth-Card. Pembroke.*

\* The form of Cheshire is not unlike that of a tea-pot.





# THE CITIES

IN

## England and Wales.



Norwich, Carlisle, Coventry,  
 Exeter and Sal'sbury ;  
 Peterborough, Canterbury,  
 Litchfield, Gloucester, and Ely ;  
 Bangor, Bristol, Chester, Bath,  
 London, Lincoln, Wells, Landaff, }  
 Durham, York, and St. Asaph ;  
 Chichester, Winchester, Westminster, Rochester,  
 Hereford, Oxford, and 28th, Worcester.

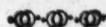


## Artificial Memory.



Men of the most profound judgment, or lively imagination, have often the most unretentive memories.

Dr. Habor.



THE following series of vowels and consonants (representing the figures) must be learned, so as to be able to form at pleasure a *technical* word, which shall stand for any number.

|          |          |          |          |          |           |           |           |           |          |
|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|----------|
| <i>a</i> | <i>e</i> | <i>i</i> | <i>o</i> | <i>u</i> | <i>au</i> | <i>oi</i> | <i>ei</i> | <i>ou</i> | <i>y</i> |
| 1        | 2        | 3        | 4        | 5        | 6         | 7         | 8         | 9         | 0        |
| <i>b</i> | <i>d</i> | <i>t</i> | <i>f</i> | <i>l</i> | <i>s</i>  | <i>p</i>  | <i>k</i>  | <i>n</i>  | <i>z</i> |

Here *a* or *b* stands for 1; *e* or *d* for 2; *i* or *t* for 3; and so on. These letters assigned to the respective figures may easily be remembered: thus, the first vowels naturally represent 12345.

The diphthong *au* stands for 6, being composed of *a* 1, and *u* 5.

The diphthong *oi* stands for 7; and *ou* for 9.

The diphthong *ei* will easily be remembered for eight.

Initials

Initials are used where they could for the consonants; as *t* for three, *f* 4, *s* six, and *n* nine.

The rest were assigned without any particular reason, unless that possibly *p* may be more easily remembered for 7, or septem; *k* 8 or ο'κτώ; *d* 2, or duo; *b* for 1, the first consonant; and *l* for 5, being the Roman letter for 50.

The diphthongs are to be considered as one letter, or rather as one figure; and *y* is to be pronounced as *w* to distinguish it from *i*: thus, *fyd* 602, pronounce *fwid*; *typ* 307, pronounce *twip*.

### Exercise.

|            |             |             |             |               |             |
|------------|-------------|-------------|-------------|---------------|-------------|
| 10         | 325         | 381         | 1921        | 1491          | 1012        |
| <i>az</i>  | <i>tel</i>  | <i>teib</i> | <i>aneb</i> | <i>afna</i>   | <i>bybe</i> |
| 739        | 680         | 553         | 431         | 7967          | 602         |
| <i>pin</i> | <i>feiz</i> | <i>lut</i>  | <i>fib</i>  | <i>pousai</i> | <i>fyd</i>  |

The same number may be signified by different words, according as vowels or consonants are chosen to represent the figures, or to begin the words; thus,

325 *tel*, or *idu*,

154 *buf*, or *klo*, or *alf*, or *alo*.

93451 *ni-ola*, or *out-fub*, or *ni-fla*, or *out-olb*,

U 3.

Although



Although *z* or *y* represents the cypher, yet where many cyphers meet, to avoid a repetition of *azyzyzy*, I use *g* for an hundred; *th* for a thousand; and *m* for a million: thus,

|             |      |               |          |
|-------------|------|---------------|----------|
| <i>ag</i>   | 100  | <i>dlg</i>    | 2300     |
| <i>ig</i>   | 300  | <i>lath</i>   | 51000    |
| <i>oug</i>  | 900  | <i>am</i>     | 1000000  |
| <i>ath</i>  | 1000 | <i>azmoth</i> | 10004000 |
| <i>oth</i>  | 4000 | <i>fumus</i>  | 65000056 |
| <i>otho</i> | 4004 | <i>loum</i>   | 59000000 |
| <i>peg</i>  | 7200 |               |          |

It may sometimes be required to set down a fraction, which can be done in the following manner: Let *r* be the separator between the numerator and the denominator, the first coming *before*, the other after it: as, *iro*  $\frac{3}{4}$ ; *urp*  $\frac{5}{7}$  *pourag*  $\frac{79}{100}$  or .79; *north*  $\frac{94}{1000}$  or .094, &c.

Where the numerator is 1, it need not be expressed, but begin the fraction with *r*: as  $\frac{1}{2}$  *re*;  $\frac{1}{3}$  *ri*,  $\frac{1}{4}$  *ro*, &c. So in decimals, .01 or  $\frac{1}{100}$  *rag*; .001 or  $\frac{1}{1000}$  *rath*.

---

THE  
**Kings and Queens**  
 OF  
*E N G L A N D,*  
 SINCE THE CONQUEST:  
 AND SOME OF  
*The most remarkable Princes,*  
*B E F O R E I T.*

~~~~~

CASSIBELAUNUS chosen chief commander by the Britons against the invasion of Julius Cæsar. Ant. Chr. 52 years.

QUEEN BOADICEA, the British Heroine, being ill-treated by the Romans, raised an army and killed 70000. A. D. 67.

VORTIGERN, invited the Saxons to the assistance of the Britons against the Scots and Picts. A. D. 446.

HENGIST, the Saxon, erected the kingdom of Kent, the first of the Heptarchv. A. D. 455.

ARTHUR, was famous for his resistance and victories over the Saxons. A. D. 514.

EGBERT, reduced the Heptarchy and was crowned first sole monarch of England. A. D. 827.

ALFRED THE GREAT, ascended the throne	
in A. D.	871
CANUTE the Dane, began to reign	1017
EDWARD the Confessor	1041
WILLIAM I. the Conqueror	1066
WILLIAM II. surnamed Rufus	1087
HENRY I.	1100
STEPHEN	1135
HENRY II.	1154
RICHARD I.	1189
* JOHN	1199
HENRY III.	1216
EDWARD I.	1272
EDWARD II.	1307
EDWARD III.	1327
RICHARD II.	1377
HENRY IV.	1399
HENRY V.	1413
HENRY VI.	1422
EDWARD IV.	1461
EDWARD V.	1483

\* John signed the famous deed of Magna Charta, at Runimede, a place between Staines and Windsor.



RICHARD III.	-	-	-	-	1483
HENRY VII.	-	-	-	-	1485
HENRY VIII.	-	-	-	-	1509
EDWARD VI.	-	-	-	-	1547
MARY	-	-	-	-	1553
ELIZABETH	-	-	-	-	1558
JAMES I.	-	-	-	-	1603
CHARLES I.	-	-	-	-	1625
CHARLES II.	-	-	-	-	1649
JAMES II.	-	-	-	-	1685
WILLIAM and MARY	-	-	-	-	1689
ANNE	-	-	-	-	1702
GEORGE I.	-	-	-	-	1714
GEORGE II.	-	-	-	-	1727
GEORGE III.	-	-	-	-	1760

## Memorial Lines.

Cafs'bel-ud, Boad-aup, Vorg-fos, Hengist-ful, Ar-laf,  
 Egber-kep, Alfred-koib, \* Can D-ap, Ed Con-fa, Wil C-fau;  
 Wil Ruf-koi, Hen Pri-ag, Ste-bil, Hen Sec-buf, Ri F-bein,  
 Runi J-ann, Hen Thir-das, Ed F-ape, Ed Sec-tyf, Ed Th-icp;  
 Ri Sec-toip, Hen Fo-toun, Hen-Qu-oat, Hen Si-fed, Ed F-ofb,  
 Ed Qui R-okt, Hen Sep-feil, H Oc-lyn, Ed Six-lop, Ma-lut,  
 Eliz-luk, Jam Pri-fyt, Char P-sel, Char Sec-son, Ja S-feil,  
 Wil Ma-fein, Anne-pyd, † Ge-bo-doi-fy.

\* Now add 1000.

† add 1700.



## Verses Valedictory.



DEAR YOUTH, be wise, nor swell the scroll of  
shame,

But shun betimes bewitching pleasure's lure;  
With zeal preserve a fair, unspotted fame,  
And O! preserve your conscience ever pure,

With noble soul disdain the partial view,  
Revere the social ties that join mankind;  
To love, to honour, and to friendship true,  
And let their dictates ever rule your mind.

Let pity's balm assuage affliction's smart,  
With lenient hand the pangs of mis'ry heal;  
Let mild benevolence entwine your heart,  
And learn the sacred luxury—to feel,

For know, unfriended, many a virtue weeps  
In deep, sequester'd solitude forlorn;  
And many an eye unceasing vigils keeps,  
Whose cherish'd brightness might eclipse the morn.

These all have claim upon the favour'd few,  
Whom fortune visits with her golden ray;  
These all in grief's expressive language sue—  
O! hear their plaints, and wipe their tears away.

So shall your hearts the sacred pleasure taste,  
That flows from sympathy's benignant reign;  
So transports soft shall smile around your breast,  
And foil the rankling barb of care and pain.

So shall your days through varied life be blest'd,  
And smiling peace your guiltless steps attend;  
So shall your soul repose in good possess'd,  
And reap eternal joys, when time is at an end.





18 AP 68

*The following, by the Author, for the Use  
of his School.*



Prayers.

Poetical Selections.

An English Spelling Book, on a new plan.

The Elements of English Grammar.

English Exercifes, with Letters, &c.

Tables of Arithmetic, with notes.

A Plain System of Practical Arithmetic.

